430 Rec'd PCT/PTO 15 APR 1999

FORM PTO-1390 REV. 5-93	US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEYS DOCKET NUMBER
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		P-99,0610
		U.S.APPLICATION NO. (if known, see 37 CFR 1.5) 09/284563

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE97/02385	15 October 1997	15 October 1996

TITLE OF INVENTION "ELECTROPHOTOGRAPHIC MACHINE WITH A DEVICE TO REMOVE OLD TONER"

APPLICANT(S) FOR DO/EO/US Blasius Wilhelm, Georg Boehmer, Karl-Heinz Jenak, Joseph Knott and Peter Bremmer

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2).

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report)**.

12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included.

13. ☒ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☐ A substitute specification.

15. ☐ A change of power of attorney and/or address letter.

16. ☒ Other items or information:
    a. ☒ Submission of Drawings - 18 sheets
    b. ☒ Submission of Proposed Drawing Changes
    c. ☒ EXPRESS MAIL #EL253252267US dated April 15, 1999

U.S.APPLICATION NO. (if known, see 37 C.F.R 1.5)	INTERNATIONAL APPLICATION NO. PCT/DE97/02385	ATTORNEY'S DOCKET NUMBER P-99,0610

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO . . . . . $840.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) . . . $670.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) . . . . . $760.00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO . . . . . $970.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) . . . . . $ 96.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 840.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed		Number Extra	Rate		
Total Claims	29	- 20 =	9	X $18.00	$ 162.00	
Independent Claims	2	- 3 =	0	X $ 78.00	$	
Multiple Dependent Claims				$260.00 +	$	
TOTAL OF ABOVE CALCULATIONS =					$1002.00	
Reduction by 1/2 for filing by small entity, if applicable. *Verified Small Entity statement must also be filed.* (Note 37 C.F.R. 1.9, 1.27, 1.28)					$	
SUBTOTAL =					$1002.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +					$	
TOTAL NATIONAL FEE =					$1002.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +						
TOTAL FEES ENCLOSED =					$1002.00	
					Amount to be refunded	$
					charged	$

a. ☒ A check in the amount of $1002.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **08-2290**. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Hill & Simpson
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85th Floor Sears Tower
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James D. Hobart
SIGNATURE

James D. Hobart
NAME

24,149
Registration Number

CERTIFICATE OF MAILING BY U.S. EXPRESS MAIL

"Express Mail" Mailing Label Number EL253252267US

Date of Deposit: April 15, 1999

I hereby certify that this correspondence is being deposited with the United States Postal "Express Mail Post Office to Addressee" service under 37 CFR 1.10(c) on the date indicated above and is addressed to:

BOX PCT
Commissioner of Patents and Trademarks
Washington, D.C. 20231

Case Number: P99,0610

International Application No.	**International Filing Date**
PCT/DE97/02385	**15 October 1997**

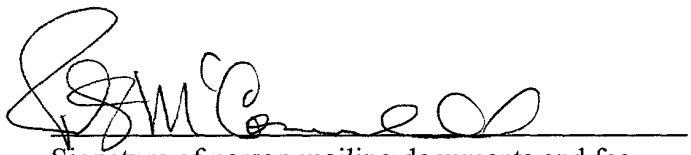
Priority Date Claimed
15 October 1996

Title: "ELECTROPHOTOGRAPHIC MACHINE WITH A DEVICE TO REMOVE OLD TONER"

Applicant(s): Blasius Wilhelm, Georg Boehmer, Karl-Heinz Jenak, Joseph Knott and Peter Bremmer

Enclosed are the following documents:

International application as filed;
English translation of application and annexes;
Information Disclosure Statement, PTO 1449,
Prior Art, Search Report;
Preliminary Amendment;
Letter Submitting Drawings - 18 sheets;
Submission of Proposed Drawing Changes;
PTO 1390 in duplicate;
Filing Fee: $1002.00; and
Postcard.



Signature of person mailing documents and fee

IN THE UNITED STATES ELECTED OFFICE OF
THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY - CHAPTER II

PRELIMINARY AMENDMENT

APPLICANTS: Blasius Wilhelm, Georg Boehmer, Karl-Heinz Jenak, Joseph Knott and Peter Bremmer

ATTORNEY DOCKET NO.: P-99,0610

SERIAL NO.: EXAMINER:

FILING DATE: ART UNIT:

INTERNATIONAL APPLICATION NO.: PCT/DE97/02385

INTERNATIONAL FILING DATE: 15 October 1997

INVENTION: "ELECTROPHOTOGRAPHIC MACHINE WITH A DEVICE TO REMOVE OLD TONER"

BOX PCT
Assistant Commissioner for Patents
Washington, D.C. 20231

S I R:

Please amend the above-identified International Application before entry into the National Stage before the U.S. Patent and Trademark Office under 35 USC 371 as follows:

IN THE SPECIFICATION:

Substitute page 1, line 1, delete "SPECIFICATION" and insert the following heading:

--**TITLE**--;

lines 2 and 3, please amend the title to read as follows:

--**"ELECTROPHOTOGRAPHIC DEVICE WITH A MEANS FOR ELIMINATING USED TONER"**--;

line 4, before "The" insert the following heading:

--**<u>BACKGROUND OF THE INVENTION</u>**--; and

line 11, after "arrested" insert --or stopped--.

Substitute page 2, line 15, after "conveyor." insert the following heading:

--**<u>SUMMARY OF THE INVENTION</u>**--;

line 7, change "continually" to read --continuous--; and

lines 21 and 22, replace these lines with the following paragraph:

--This object is achieved by an improvement in an apparatus for electrographically producing image patterns on a recording medium, such as a printer or copier, which apparatus comprises at least one printing unit to which toner is supplied from a toner reservoir and has means for elimination of used toner collected at the cleaning station by transferring the used toner to a used toner container. The improvement is that the means is interruptible to allow replacing or changing of the used toner container without interrupting the printing operation and the means has a controllable coupling that can be actuated between a drive and conveyor shaft for the transfer of the toner from the cleaning station.--.

Substitute page 3, delete lines 6 and 7;

line 11, change the line to read --inventive features are described.

<u>BRIEF DESCRIPTION OF THE DRAWINGS</u>--;

line 12, after "1" insert --is--;

line 14, after "2" insert --is--;

line 15, after "3" insert --is--;

line 16, after "4" insert --is--;

line 17, after "5" insert --is a schematic view with--;

line 19, after "6" insert --is a schematic view with--;

line 20, change "7a, b" to read --is a schematic view of--;

same line, after "with" insert --a cap removed from a--;

line 21, afer "8" insert --is--;

line 22, after "9" insert --is--; and

line 23, after "10" insert --is a schematic view of an arrangement for--.

Substitute page 3a, first line, after "11" insert --is--;

line 4, after "12" insert --is a schematic view of--;

line 5, after "13" insert --is--;

line 7, after "14" insert --is--;

lines 9-11, replace these lines with the following paragraphs:

--Figures 15A, 15B and 15C are different vies of an adapter unit with Figure 15A being a side view, Figure 15B being a top plan view and Fig. 15C being a cross-sectional view;

Figure 16A is a side view of the adapter in a relaxed state;

Figure 16B is a side view of the adapter in a compressed state;--;

line 12, after "17" insert --is a side view of--;

line 14, after "18" insert --is--;

line 16, after "19" insert --is--;

lines 17-18, replace these lines with the following paragraphs:

--Figure 20A is a schematic view of the drawer with a full, used toner container in an opened position to illustrate the condition Z1;

Figure 20B is a schematic view of the drawer with the used toner container removed to illustrate the condition Z2;

Figure 21A is a schematic view of the drawer with a partially filled, used toner container in the opened condition to illustrate the condition Z3;

Figure 21B is a schematic view of the drawer in a closed position and the container no yet full to illustrate the condition Z4; and--;

line 19, after "22" insert --is a schematic side view of--; and

line 21, after "operations." insert the following heading:

--**DESCRIPTION OF THE PREFERRED EMBODIMENTS**--.

Page 4, line 7, change "stores" to read --doors--;

lines 11 and 12, change "in the opened condition of the device door 12a, 12b." to read --when either of the doors 12a and 12b are in an open condition.--; and

line 22, before "printing" insert --the--.

Page 5, line 10, after "facilitate" insert --an--; and

line 20, change "3.6 1" to read --3.6 liters--.

Page 6, line 6, change "40" to read --50--;

line 19, after "slight" insert --vacuum or--; and

line 24, after "ventilator" insert --or fan--.

Page 7, line 24, after "amount" insert --of toner--.

Page 8, line 9, change "comprised in" to read --by--;

line 15, change "flattening" to read --blackening--;

line 30, change "18" to read --80--;

line 31, after "as" insert --a--; and

same line, change "this having to assure" to read --which assures--.

Page 9, line 3, change "Figure 18" to read --Figures 15A, 15B and 15C--;

line 17, change "16" to read --16B--;

line 19, change the line to read --one another. In Figure 16A, the principal--;

line 21, after "lines," insert --and the toner descends--; and

line 26, change "rotatable" to read --to rotate--.

Page 11, line 21, change "20 and 21" to read --20A, 20B, 21A and 21B--;

line 22, change "20 left" to read --20A--.

Page 12, line 3, change "21" to read --21A--.

Substitute page 14, line 1, change "Claims" to read --**WE CLAIM**:--.

IN THE CLAIMS ON SUBSTITUTE PAGES 14-18:

Please amend claim 1 to read as follows:

--1. (Amended) Device for the electrophotographic production of image patterns on a recording medium, [particularly a printer or copier,] comprising at least one printing unit to which toner is supplied, [whereby the] elimination [of the] means for transferring used toner collected from a cleaning station [(80)] to a used toner container [(84) is], said means being interruptible in order to enable a replacement of the used toner container [(84)] free of printing interruptions, and [whereby] said

means having a controllable coupling that can be actuated for changing the used toner container free of printing interruptions [is] being connected between a drive [(134)] and a conveyor shaft [(132)] of the means for toner elimination from the cleaning station [(20)].--

Claim 2, line 1, change "characterized in that" to read --wherein--;
line 2, delete "(80)" and "(84)";
line 3, delete "(82)" and "(132)";
line 4, delete "(92)";
same line, change "in that" to read --wherein--; and
line 5, delete "(84)".

Claim 3, line 1, change "or 2, characterized in that" to read --, wherein--; and
line 2, delete "(92)".

Claim 4, line 1, change "characterized in that" to read --wherein--;
line 2, delete "(82)"; and
line 3, delete "(92)".

Claim 5, line 1, change "characterized in that" to read --wherein--;
line 2, delete "(138)" and "(84)"; and
line 3, delete "(82)".

Claim 6, lines 1 and 2, change "one of the claims 3 through 5, characterized in that" to read --claim 3, wherein--; and
line 2, delete "(92)".

Claim 7, lines 1 and 2, change "one of the claims 3 through 6, characterized in that" to read --claim 3, wherein--;

line 2, delete "(92)"; and

line 3, delete "(84)".

Claim 8, lines 1 and 2, change "one of the claims 2 through 7, characterized in that" to read --claim 3, wherein--;

line 2, delete "(82)" and "(88)";

line 3, delete "(20)" (both occurrences);

line 4, delete "(90)" and "(84)";

line 5, delete "(100)" and "(92)"; and

line 6, delete "(90)".

Claim 9, lines 1 and 2, change "one of the preceding claims, characterized in that" to read --claim 1, wherein--;

line 2, delete "(84)" and "(110)"; and

line 3, delete "(112)".

Please amend claim 10 to read as follows:

--10. (Amended) Device according to claim 9, [characterized in that,] wherein, when [the] a drawer [(110)] is pulled out, [the] a locking plate [(100)] has an end facing away from its pivot point [(119)] rising up on a ramp while compressing [the] a flexible hose [(92);] of the coupling and [in that] the locking plate [(100)] engages behind a stop edge [(124)] when the drawer [(110)] is pushed in.--

Claim 11, lines 1 and 2, change "one of the claims 9 or 10, characterized in that" to read --claim 9, wherein--;

line 2, delete "(110)" and "(118)";

line 3, delete "(116)" and "(84)";

line 4, delete "(120)";

line 5, delete "(118)" and "(120)"; and

line 6, delete "(84)".

Claim 12, line 1, change "characterized in that" to read --wherein--; and

line 2, change "(120) is fashioned as" to read --is a--.

Claim 13, lines 1 and 2, change "one of the claims 9 through 12, characterized in that" to read --claim 9, wherein--; and

line 2, delete "(122)".

Please amend claims 14 and 15 to read as follows:

--14. (Amended) Device according to claim [12 and] 13, [characterized in that the] which includes a control [evaluates] to evaluate the signal statuses of [the] a filling level sensor [(120)] and of the microswitch [(122)] inn order to control the replacement of the used toner container and the printing operations.--

--15. (Amended) Device according to [one of the preceding claims 2 through 14, characterized in that] claim 2, which includes an intermediate container [(142)] that can be pivoted in against the adapter unit [(82)] instead of the used toner container [(84) is provided, the used toner being collected therein] during the replacement of the used toner container [(84)].--

Please cancel claim 16, without prejudice, and substitute the following claim:

--25. A device according to claim 1, which includes a toner reservoir with a filling opening for each printing unit being permanently installed in the device, a lockable door for covering the internal parts of the device and the toner reservoir, electrical safety means to stop operation of the printing unit when the door is opened, the door having a closable opening adjacent the filling opening so that the reservoir can be filled without opening the door to stop the operation of the printing unit.--

Claim 17, line 1, change "16, characterized in that" to read --25, wherein--; and

line 2, delete "(14, 16)" and "(12a, 12b)".

Claim 18, line 1, change "characterized in that" to read --wherein--;

lines 1 and 2, delete "(14, 16)";

line 2, change "such" to read --so--; and

same line, delete "(32)".

Please cancel claims 19-23, without prejudice, and substitute the following claims:

--26. A device according to claim 25, wherein the filling opening of the reservoir has a releasable mouthpiece.--

--27. A device according to claim 25, which includes means for generating a slight under-pressure in the toner reservoir during a filling procedure.--

--28. A device according to claim 27, wherein the means for generating a slight under-pressure includes the reservoir having an air elimination opening with a filter to retain the toner in the reservoir.--

--29. A device according to claim 25, which includes the toner reservoir having a filling level sensor to determine the filling level, said sensor generating an alarm signal when the filling level drops below a set position, and means to create an abort signal for the printing operation at a period after the alarm signal.--

--30. A device according to claim 29, wherein the level sensor is a capacitative sensor being mounted for displacement in an axial direction on an outside wall of the reservoir and generating the alarm signal when the level falls below the sensor, said means to create an abort signal depends on the use of the toner after the alarm signal.--

Claim 24, line 1, change "23" to read --30--; and

same line, change "characterized in that" to read --wherein--.

Please add the following claims:

--31. A method for changing a used toner container in an apparatus for the electrophotographic generation of image patterns on a recording medium, said apparatus having at least one printing unit to which toner is supplied, a cleaning station for cleaning used toner therefrom, and means for eliminating used toner from

the cleaning station to a toner container, said method comprising the steps of interrupting the flow of toner in said means for eliminating, and replacing the used toner container without interrupting the printing operation of the printing unit.--

--32. A method according to claim 31, wherein the means for eliminating includes a controllable coupling between a conveyor shaft and a drive of the means for eliminating, and said step of interrupting includes actuating the controllable coupling to stop the flow in the means for eliminating.--

--33. A method according to claim 31, wherein the means for eliminating includes a conveying channel and an adapter unit, and wherein the step of changing the toner container includes storing used toner in said conveying channel.--

--34. A method according to claim 33, wherein the step of storing includes closing the adapter unit while changing the toner container to prevent the emergence of used toner from the adapter unit.--

--35. A method according to claim 33, wherein the apparatus includes an intermediate container mounted for movement between a position adjacent the adapter unit to receiving used toner from the adapter unit, and said method of storing includes shifting the intermediate container to a position under the adapter unit to receive the used toner as the used toner container is being replaced.--

REMARKS

Claims 1-15, 17, 18 and 24-35 are presented for examination.

By this amendment, the specification has been amended to provide headings and to correct grammatical errors and the claims have been amended to place them in form for examination in the U.S. Patent Office. In addition, method claims 31-35 have been added.

Respectfully submitted,

(Reg. No. 24,149)
HILL & SIMPSON
A Professional Corporation
85th Floor - Sears Tower
Chicago, Illinois 60606

Telephone: (312) 876-0200 - Ext. 647

DATED: April 15, 1999

**IN THE UNITED STATES ELECTED OFFICE OF
THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY - CHAPTER II**

SUBMISSION OF PROPOSED DRAWING CHANGES

APPLICANTS: Blasius Wilhelm, Georg Boehmer, Karl-Heinz Jenak, Joseph Knott and Peter Bremmer

ATTORNEY DOCKET NO.: P-99,0610

SERIAL NO.: EXAMINER:

FILING DATE: ART UNIT:

INTERNATIONAL APPLICATION NO.: PCT/DE97/02385

INTERNATIONAL FILING DATE: 15 October 1997

INVENTION: "ELECTROPHOTOGRAPHIC MACHINE WITH A DEVICE TO REMOVE OLD TONER"

BOX PCT
Assistant Commissioner for Patents
Washington, D.C. 20231

S I R:

Applicants are proposing to amend sheets 11/18; 12/18; 16/18 and 17/18, as indicated in red in the attached four sheets of drawings. These changes are to overcome multiple drawings assigned the same Figure number for original Figs. 15, 16, 20 and 21.

If these proposed drawing changes are accepted, corrected Formal Drawings will be submitted once the application has been allowed.

Respectfully submitted,

(Reg. No. 24,149)

HILL & SIMPSON
A Professional Corporation
85th Floor - Sears Tower
Chicago, Illinois 60606

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DATED: April 15, 1999

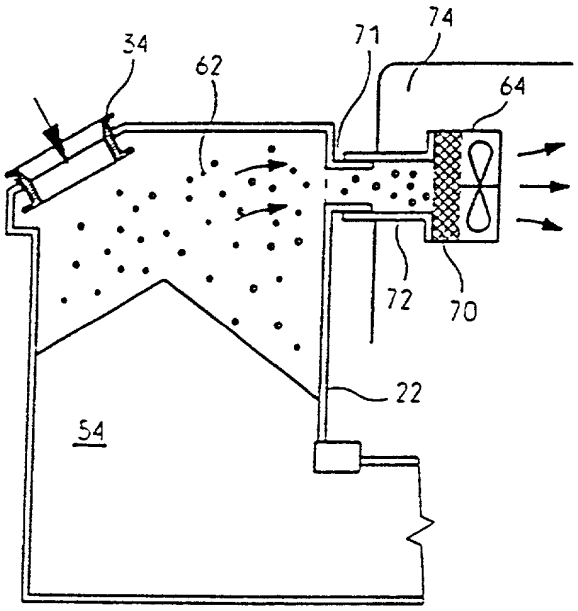


Fig. 12

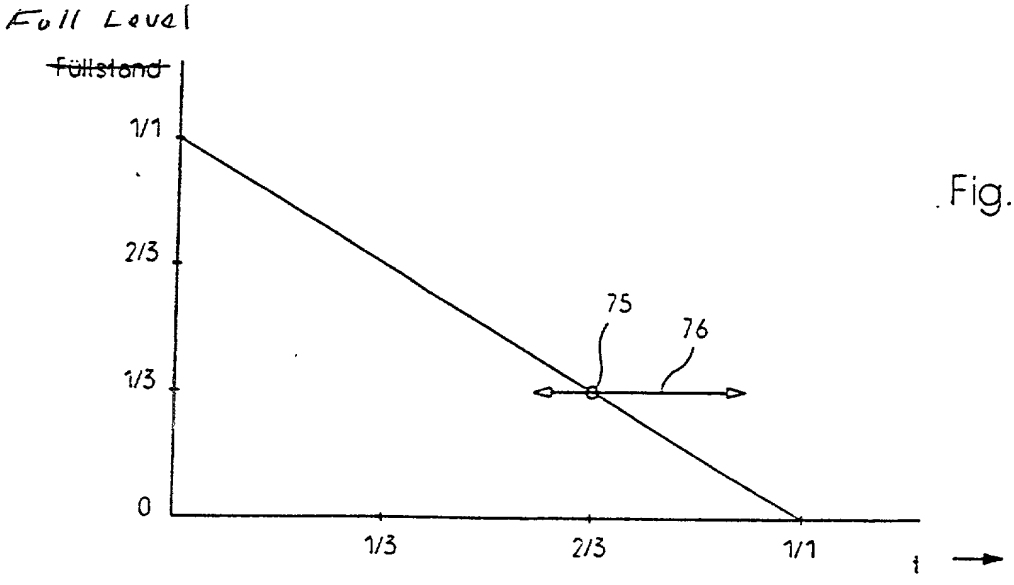


Fig. 13

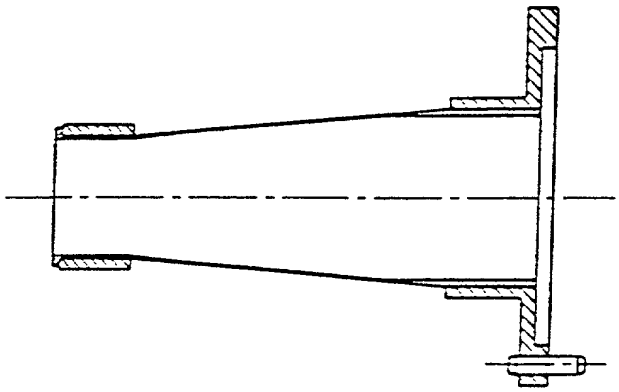


Fig. 15C

FIG 15A

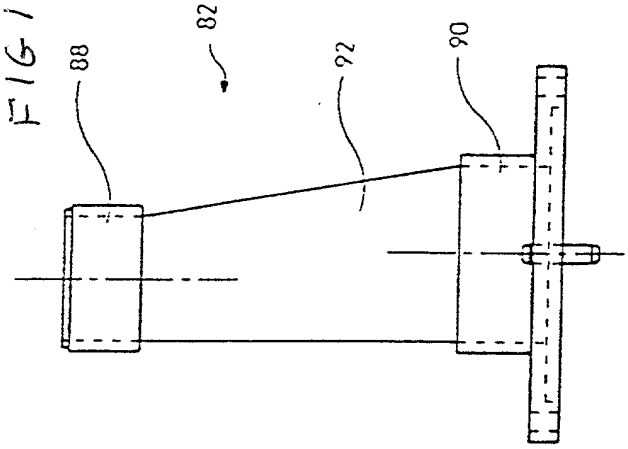


FIG 15B

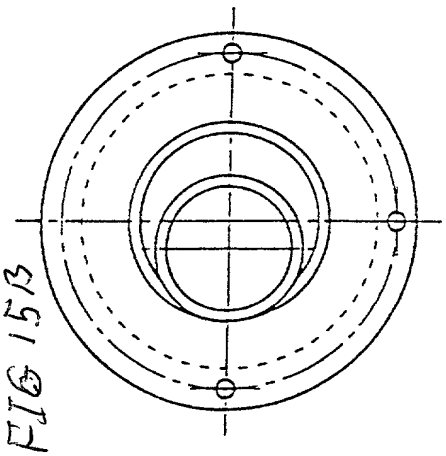


FIG 16A

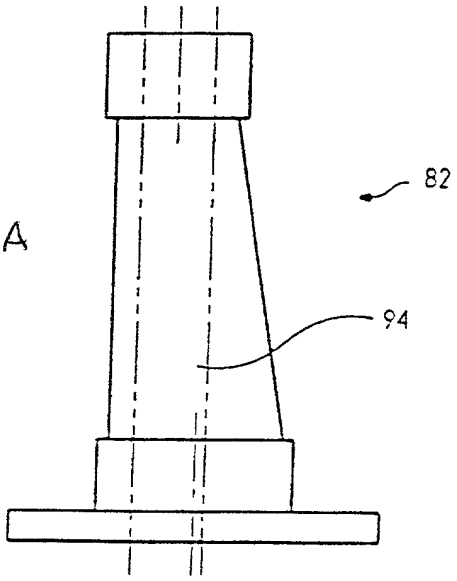
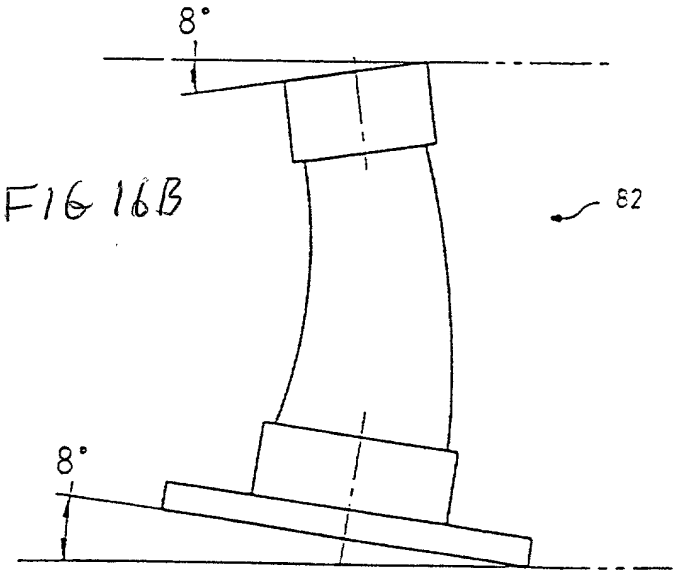


Fig. 16

FIG 16B



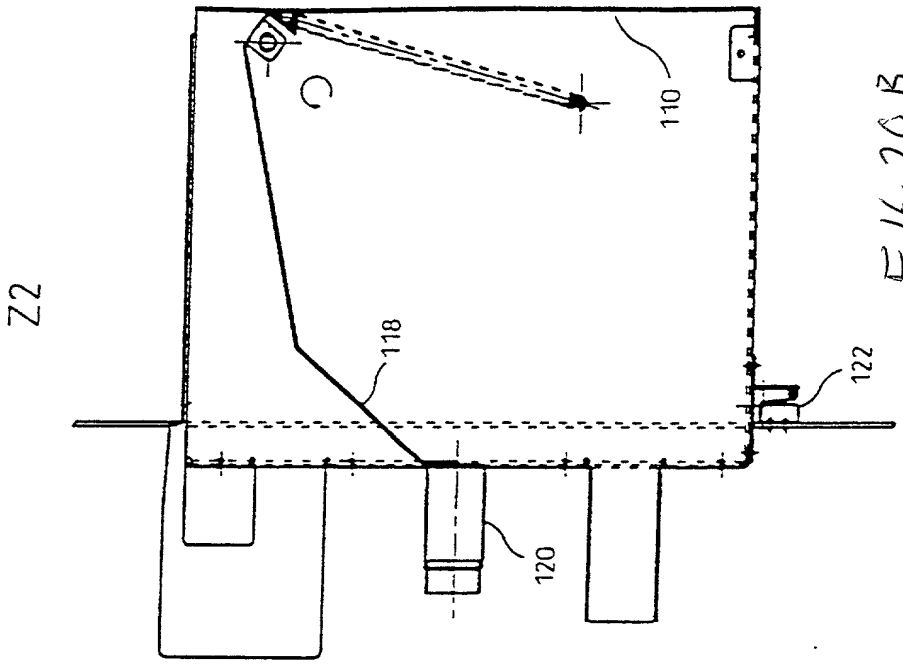


FIG 20B

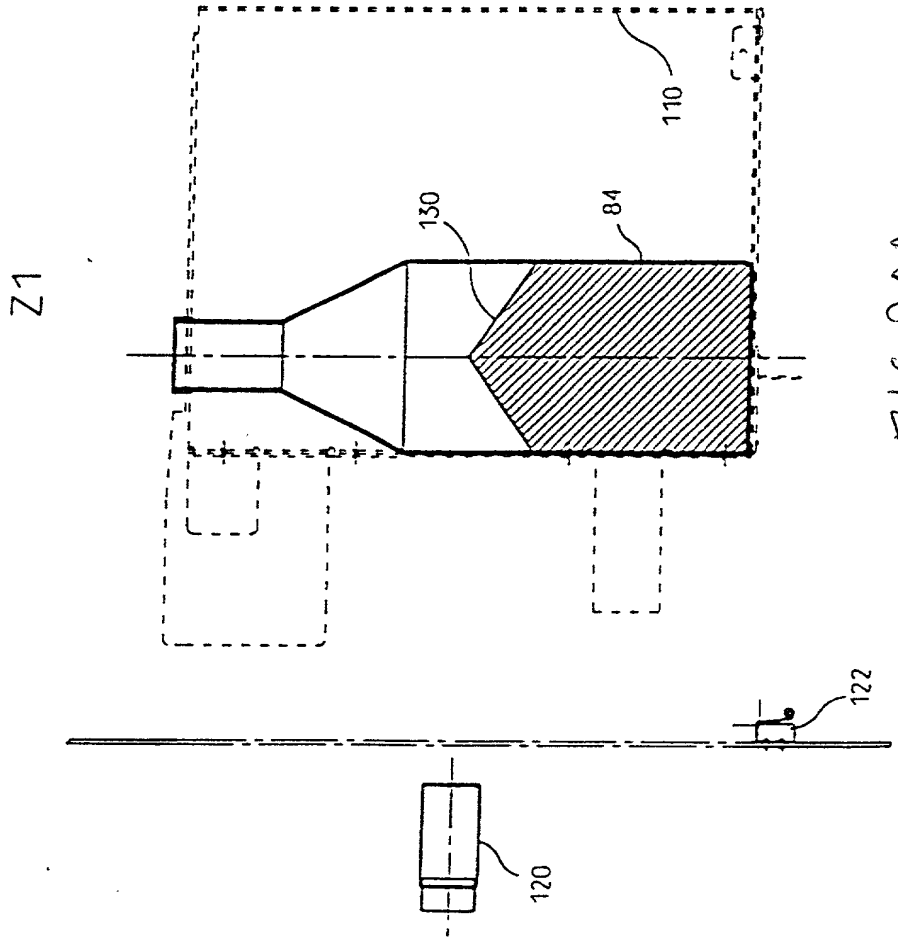
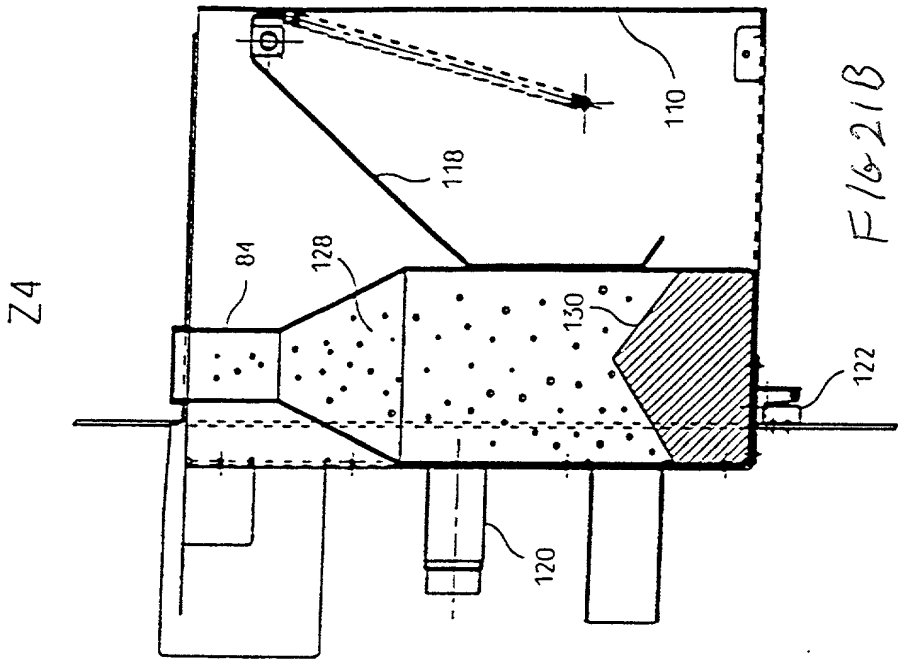
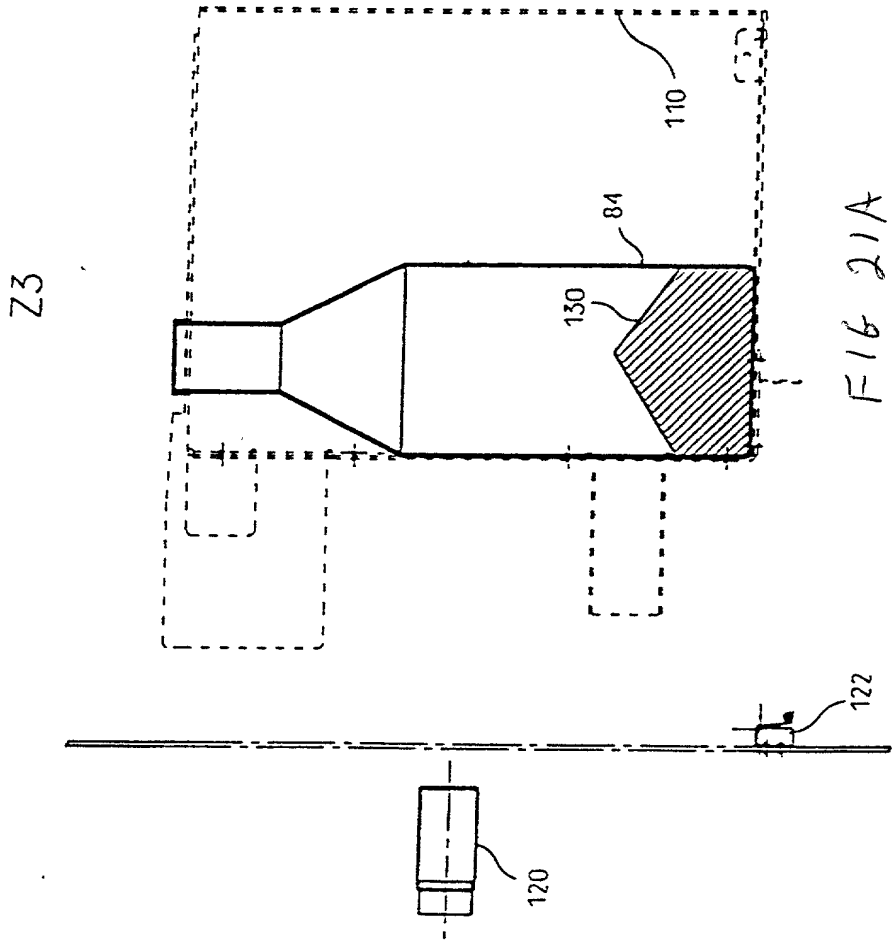


FIG 20A

Fig. 20



F16 21B



F16 21A

Fig. 21

5002

522 Rec'd PCT/PTO 04 JAN 2001

#5

PCT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CHANGE OF ADDRESS OF APPLICANTS' REPRESENTATIVES

APPLICANT: Blasius Wilhelm, et al   Case No.: P99,0610

SERIAL NO.: 09/ 284,563   GROUP ART UNIT:

DATE FILED: April 15, 1999   EXAMINER:

5000

INVENTION: ELECTROPHOTOGRAPHIC DEVICE WITH A MEANS FOR ELIMINATING USED TONER

Assistant Commissioner of Patents and Trademarks
Washington DC 20231

S I R:

Members of the Firm of Hill & Simpson designated on the original Power of Attorney have merged into the firm of Schiff Hardin & Waite. All future correspondence for the above-referenced application therefore should be sent to the following address:

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Also, please provide the current status of this application to us. A Petition to Revive was mailed to the PTO on April 28, 2000 and no response has been received.

Respectfully submitted,

(Reg. No. 24,149)

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SPECIFICATION

ELECTROPHOTOGRAPHIC DEVICE WITH A MEANS FOR ELIMINATING USED TONER

The invention is directed to a device for the electrographic generation of image patterns on a recording medium, particularly printer or copier, having at least one printing unit to which toner is supplied from a toner reservoir. According to various aspects of the invention, the invention is directed to means for delivering the toner and/or for eliminating the toner in such a device.

When the toner's supply in the toner reservoir in a known printer is running out, a signal is generated that causes the printer to be arrested. An operator must then refill toner from a standardized refilling container into the toner reservoir. After the end of the filling procedure, printing operations can be re-assumed. A similar case applies for handling used toner that is collected from a cleaning station in the printer or copier. When a used toner container has reached a high filling level, an operator is informed of this with an alarm signal. Printing operations are interrupted and the full used toner container is replaced with an empty one. The described procedure reduces the availability, economic feasibility and user-friendliness of the printer or, respectively, copier. This is felt particularly given high-performance printers that should print or, respectively, copy optimally interruption-free in order to achieve their full efficiency.

US-A,5,329,340 discloses an apparatus for the electrophotographic generation of image patterns on a recording medium. The apparatus contains two toner reservoirs. When the first toner reservoir is empty, a switch is made to the second toner reservoir. The used toner that arises is collected in a used toner container. When the used toner container is not available, the used toner is collected in an additionally provided container inside the apparatus or outside the apparatus.

DE-A-39 21 806 discloses a dry copier device wherein the excess toner is collected in a collecting container that is arranged outside the copier

device. The collecting container is connected to the copier device with a conveyor conduit. The conveyor conduit contains a downpipe, so that the toner is further-conveyed due to the influence of gravity. The elimination of the toner in the direction of the collecting container ensues with the assistance of a worm conveyor.

US-A-4,967,234 discloses a copier device whose device covers, for example device doors, are connected to an electrical safety means. When the device doors are opened, the copier device is shut off by this safety device. An opening that is not connected to the safety device is incorporated into the device cover. A toner container with fresh toner can be supplied to the copier device via this opening. The fresh toner is refilled into a container. The toner container emptied in this way is then filled with used toner.

US-A-5,309,211 describes a laser printer. The used toner output by a cleaning station is conveyed to a used toner container with the assistance of an intermittently operating worm conveyor.

An object of the invention is to specify a device for the electrographic generation of image patterns on a recording medium wherein the apparatus operation is as continuous as possible. In particular, it is an object of the invention to enable the continuous elimination of used toner without interruption of apparatus operations.

For a device as initially cited, this object is achieved by the features of claim 1.

According to an exemplary embodiment of the invention, an opening is provided in a device cover through which the toner reservoir can be refilled from the outside without interrupting operations. In particular, a closeable opening through which the toner reservoir can be refilled is provided in the apparatus store in the region of a filling opening of the toner reservoir. For safety reasons, the device door can be connected to an electrical safety means that interrupts operation of the device when the device door is opened. In order to be nonetheless able to refill toner, an opening can be inserted in this device door whose condition, i.e. whether open or closed, is not evaluated for the operation of the printer. The toner reservoir can then

be filled through this closeable opening. An opening of the device door with the result that the security means shuts the device off is not required.

As a result of the invention, an electrophotographic device can work interruption-free with high efficiency, even when the toner consumption is extremely high.

Further aspects and advantageous developments of the invention are recited in the dependent claims.

Exemplary embodiments of the invention are explained below with reference to the drawing. In this explanation, further features of various aspects of the invention, advantageous effects and the combination of inventive features are referred to. Shown in the drawings are:

Figure 1	a front view of a high-performance printer with closed flaps;
Figure 2	the front view of Figure 1 with open flaps;
Figure 3	a schematic view when refilling the toner reservoir;
Figure 4	the view of Figure 3 with closed flaps;
Figure 5	a flap in the proximity of the upper edge of the printer in the condition with the refilling bottle inserted;
Figure 6	the upper flap of Figure 5 in the closed condition;
Figure 7a,b	a toner reservoir with mouthpiece;
Figure 8	a side view of the toner reservoir;
Figure 9	a view of the toner reservoir from the front;
Figure 10	the generation of an under-pressure in the toner reservoir;

Figure 11	the connection of a connecting hose, shown schematically;
Figure 12	the arrangement of a filter outside the toner reservoir;
Figure 13	a diagram of the decrease of the amount of toner over the operating time;
Figure 14	a schematic side view of the adapter unit connected to a used toner container;
Figure 15	views of the adapter unit;
Figure 16	the adapter unit in the relaxed and in the compressed condition;
Figure 17	the adapter unit when replacing the used toner container;
Figure 18	a side view of the used toner container introduced into a drawer;
Figure 19	a diagram for defining various operating conditions;
Figures 20 and 21	the various operating conditions when replacing the used toner container; and
Figure 22	further exemplary embodiments for a replacement of the used toner container without interrupting printing operations.

Figure 1 schematically shows the front side of a high-performance printer 10 that can print single sheets at high speed. The high-performance printer 10 contains two printing units (not shown) to each of which a respective toner reservoir from which toner is supplied to the respective printing unit is allocated. The toner reservoir essentially permanently installed in the high-performance printer 10 and must be refilled at time intervals via a filling opening 20 depended on the use. The two device stores 12a, 12b pivotable toward the outside serve the purpose of covering internal parts of the high-performance printer 10 as well as the toner reservoir. The device doors 12a, 12b are connected to an electrical security means that interrupts operations of the high-performance printer 10 in the opened condition of a device door 12a, 12b. In order to avoid such an interruption and nonetheless enable a refilling with toner, a respective opening closeable by flaps 14, 16 is provided in the region of the respective filling opening 20 of the two toner reservoirs, said openings not being connected to the safety system. A control panel 18 that, as described later, can be pivoted out is arranged above the flap 16.

Figure 2 shows the front view of the high-performance printer 10 of Figure 1 with opened flaps 14, 16. In the opened condition of the flaps, the filling openings 20 of the toner reservoirs 22 become visible. Toner from a standardized refilling bottle can thus be refilled into the toner reservoirs 22 without opening the device door 12a, 12b and interrupting printing operations. In the closed condition of the flap 14, 16, the internal parts of the high-performance printer 10 are again completely protected from the outside world.

Figure 3 shows the condition when refilling with a standardized toner refilling bottle 24. The refilling bottle 24 is introduced into an opening of the toner reservoir 22 through an opening 28 in the cladding panels 30 with its bottleneck 26 in an oblique position and the toner reservoir 22 is filled with toner. After the filling, the flap 16 closes the opening 28.

The flap 16 is shaped such that it defines an upwardly opened container space 32. This container space 32 serves the purpose of

collecting toner that is potentially spilled during filling. The access to the toner reservoir 22 for the refilling bottle 24 is fashioned such that a spilling of toner when the refilling bottle 24 is applied can be easily avoided, and the emptying of the refilling bottle 24 can ensue unproblemmatically by the force of gravity as a result of its oblique attitude.

It can be seen in the upper part of the Figure that the operating panel 18 can be pivoted. A filling opening of the toner reservoir 22 is fashioned such that, when filling with the standardized refilling bottle 24, this can be introduced with play at the swivelled-out operating panel 18.

To facilitate understanding, Figure 4 shows the flap 16 in the closed condition wherein the opening 28 is completely covered.

Figure 5 shows another exemplary embodiment wherein the flap 14 is arranged in the upper edge reading of the cladding of the high-performance printer 10. According to Figure 6, it can be seen that the cuboid-shaped housing form is again completed in the closed condition of the flap 14.

Figure 7 shows the toner reservoir 22 as a partial excerpt. The toner reservoir 22 holds the contents of two refilling bottles each having respectively 0.6 kg of toner. Accordingly, the toner reservoir 22 has a receptacle volume of approximately 3.6 l, whereby the tone arising during the filling procedure is to be taken into consideration as an additionally required space when designing the toner reservoir 22. A mouthpiece 34 that is fixed by a spring element 35 is introduced into the toner reservoir 22. The mouthpiece 34 has a funnel-shaped section 36 that assures that an optimally small annular gap arises between opening of the mouthpiece 34 and the refilling bottle. The center axis of the opening of the mouthpiece 34 proceeds obliquely relative to the vertical, so that the refilling bottle can be applied in an oblique attitude and a spilling of toner is avoided. The center axis of the opening of the mouthpiece 34 approximately intersects the center axis of the toner reservoir 22, this assuring that the cone is built up in the middle of the toner reservoir 22. The opening of the mouthpiece 34 is tightly closed with a closure cover 37 after the refilling. The closure cover 37 has

a spring snap 38 at its underside with which, after being introduced, it engages into the mouthpiece 34 with a snap-in event. The closure cover 37 has a handle 40 at its upper side.

Figure 8 schematically shows the structure of the toner reservoir 22 from the side. The center axis 44 of the mouthpiece 34 intersects the center axis 46 of the toner reservoir at approximately half height. A channel 40 via which toner 54 is conveyed off in the direction of the arrow 48 to the printing unit is located in the lower region of the toner reservoir.

Figure 9 shows a view from the front. The mouthpiece 34 is located in the middle of the toner reservoir 22, as a result whereof a uniform delivery and an optimum, uniform emptying of the toner reservoir 22 is assured. A filling level sensor 58 emits an alarm signal when the toner 54 has reached the level 60 (hatched line). The remaining amount 56 is then still adequate in order to enable a refilling of the toner without an interruption of printing having to ensue. Two pivot arms 52 that turn oppositely toward one another see to it that toner adhering to the inside wall of the toner reservoir 22 is scraped off and a dense cone 42 arises.

Figures 10, 11 and 12 are directed to a further aspect of the invention in accord wherewith a slight under-pressure is generated in the toner reservoir. Figure 10 illustrates the refilling of the toner reservoir 22. When refilling toner from the refilling bottle 24, toner dust 62 arises that can emerge from the annular gap opening at the mouthpiece 34 without further measures. Inventively, air is extracted from the toner reservoir 22 via an air elimination opening 66 with a ventilator 64, at least during the filling procedure, as a result whereof air is suctioned through the annular gap at the bottleneck in the direction of the arrows 68. Toner dust 62 cannot emerge. The air elimination opening 66, according to Figure 10, is provided with a filter 70 at the inside of the toner reservoir 22 that retains toner. The air elimination opening 66 is arranged in the upper region of the toner reservoir 22, preferably in the toner-free area.

Figure 11 shows an alternative embodiment. A discharge connector 71 is connected to a connecting hose 72 that leads into the inside 74 of the

printer. The ventilator 64 in this version is arranged in the inside 74 of the printer. Figure 12 shows a development of the arrangement according to Figure 11. In this development, the filter 70 is arranged in the inside 74 of the printer and not in the toner reservoir 22.

During operation of the printer, a control sees to it that the under-pressure in the toner reservoir 22 is built up no later than the beginning of the toner refilling event, this having to be retained until the end of the refilling event. For example, the start of the extraction can ensue with an electromechanical switch that is actuated when the toner reservoir 22 is opened. It is also possible to maintain the under-pressure in the toner reservoir 22 during the entire operation of the printer.

Figure 13 shows a diagram with reference whereto the decrease in the toner filling level in the toner reservoir 22 over the operating time of the printer is illustrated. The operating time is shown on the abscissa, the toner filling level is shown on the ordinate. The toner filling level 75 at which the filling level sensor 58 outputs an alarm signal is entered into the characteristic. This alarm signal means that the toner will soon run out and toner must be refilled. Within the remaining time wherein there is still adequate toner in order to maintain printing operations, an operator must replenish the toner. The position of the printing level sensor 58 can be modified, as a result whereof the range of remaining time within which the refilling can ensue without interrupting printing operations illustrated by an arrow 76 can be set. The alarm signal is preferably output when the filling level lies at 10-40% of the overall amount in the toner reservoir 22. When the remaining toner is used, then the control must generate an abort signal with which printing operations are shut off. In addition to generating an abort signal after a predetermined time has elapsed, it can also be generated dependent on the use of the remaining toner. For example, the use of toner can be determined on the basis of a toner mark regulation in conjunction with a clock toner conveying. Given this toner mark regulation, a control pulse for toner conveying is output for a dosing shaft controlled step-by-step given every toner mark on the photoconductor drum of the printing unit that is inked

too lightly. The time for a toner delivery, i.e. for a specific amount of toner, can be set in defined fashion per control pulse. When the remaining amount of toner will be used after the occurrence of the alarm signal can be identified from the addition of the conveying times and the dosing quantity per time unit. The abort signal can be accordingly generated. In this way, the overall time within which a refilling of toner must ensue in order to maintain operations free of printing operations can be optimally determined.

Another possibility of determining the toner use and generating the abort signal is comprised in determining the use of toner on the basis of the printed picture elements and of the printing contrast that has been set. Of course, it is also possible to determine a specific number of pages that are still allowed to be printed after the occurrence of the alarm signal until the abort signal is generated. What is thereby disadvantageous is that the remaining time can be extremely short for the refilling, since the toner consumption is highly dependent on the degree of flattening of the printed pages.

On the basis of the current consumption of toner and the amount of refilled toner after the occurrence of the alarm signal, it is also possible to continuously determine the actual filling level in the toner reservoir 22. This actual filling level can then be displayed on a display at the printer. The level at which the filling level sensor 58 outputs its alarm signal then serves as measuring point for the actual toner filling level in the toner reservoir 22.

The following Figures 14-22 are directed to means for eliminating used toner that is collected by the cleaning system in the printing unit. Figure 14 schematically shows the elimination of the used toner output from the cleaning station 80 via an adapter unit 82 into a used toner container 84. When the bulk fill level 86 in the used toner container 84 has reached a specific height, the used toner container 84 must be replaced with an empty one. In order to enable this in a simple way, the used toner container 84 is not connected directly to the cleaning station 18; rather, the adapter unit 82 is provided as connecting piece, this having to assure that the toner does not

adhere to it or collect at it either due to its coercive forces or due to the residual electrical charge, which can lead to a blockage.

The structure of the adapter unit 82 is shown in Figure 18 in a side view, a plan view and in a side cross-section. The adapter unit 82 has a stable color 88 at the side of the cleaning unit 20 that is fashioned as a rotary part. A further rotary part 90 that, as shall be explained later, is accepted in a locking plate is provided at the side of the used toner container 84. A flexible hose 92 is arranged between the color 88 and the rotary part 90. This hose 92 is composed of silicone-containing plastic and is vulcanized into the parts 88, 90. Due to the flexibility of the hose 92, a horizontal compensation of design tolerances can ensue on the one hand; on the other hand, this hose 92 can execute vertical movements and deformations without a permanent deformation remaining. The hose 92 expands in the fashion of a conical frustum in the direction toward the used toner container. As a result thereof, a permanent collection of used toner in the hose 92 is avoided.

Figure 16 illustrates the flexibility of the adapter unit 82, whereby it can execute an angular motion of approximately 8° at both ends independent of one another. In the upper part of the illustration of Figure 16, the principal descending channel 94 wherein the used toner overcomes a descending path of approximately 100 mm is entered with dash-double dot lines, without a clumping of the used toner or an adhesion thereof to the inside ensuing.

Returning to Figure 14, it can be seen that the adapter unit 82 is connected to a swivel arm 96 of the cleaning unit 80 by a clamped connection 98. The rotary part 90 is accepted in a recess of a locking plate 100 that is seated in a peg 102 rotatable in a plane 104 that resides perpendicular to the paper plane. The locking plate 100 is pre-stressed in the direction of the used toner container 84 with a tension spring 106.

Figure 17 shows the adapter unit 82 and the locking plate 100 when the used toner container (not shown in Figure 17) is being replaced. For unlocking, the locking plate 100 is pressed up upon exertion of a force F of approximately 15 N, whereby the rotary part 90 has its inside surface

separating from the neck 108 of the used toner container 84 while compressing the hose 92. In this condition, the used toner container 84 can be moved out, as explained in greater detail in the following Figure 18.

Figure 18 shows a side view of the used toner container 84 introduced into a drawer 110. The operating condition wherein used toner is conducted into the used toner container 84 is shown. The drawer 110 is seated on telescoping rails 112 and can be pushed out in the direction of the arrow 114 in order to replace the used toner container 84. The used toner container 84 is pressed against the back wall 115 of the drawer 110 with the force F by a pivot element 118 formed of sheet metal and is thus pressed against the acquisition surface of a capacitative filling level sensor 120. The force F is derived from a tension spring 116. The pivot element 118 is pivotably seated around a pivot bearing 119. A microswitch 122 acquires the position of the drawer 110. Its signal is evaluated for monitoring, as explained in greater detail below.

In the illustrated, retracted condition of the drawer 110, the locking plate 100 engages into a stop edge 124 of a side panel of the drawer 110. For replacing the used toner container 84, as mentioned, the locking plate 100 is raised and pivoted out perpendicular to the paper plane, so that the adapter unit 82 detaches from the used toner container 84. A ramp 126 serves the purpose of assuring that the adapter unit 82 remains in a compressed condition in the withdrawn condition of the drawer 110. In this hinged-up position, the hose 92 is bent off once or repeatedly and thereby seals the adapter unit in view of the used toner. Toner particles cannot escape from the adapter unit in this condition; after the drawer has been withdrawn by about 300 mm, the full used toner container 84 can be replaced with an empty one. The new used toner container is pressed against the filling level sensor 120 by the swivel element 118, so that a stable operating position is achieved. Subsequently, the drawer 110 is again closed, this being signaled by the microswitch 122. The locking plate 100 thereby again lowers, the bend or, respectively, bends in the hose 92 released and used toner can again emerge from the adapter unit 82 into the

used toner container 84. A further microswitch 200 detects the raised or, respectively, lower position of the locking plate.

For monitoring the various operating conditions during replacement of the used toner container free of printing operations, the microswitch 122, the filling level sensor 120 and the microswitch 200 are employed for signaling. The various operating conditions Z1 through Z4 are shown in Figure 19 dependent on the signals of the two detectors 120 and 122. The filling level sensor 120 has a signal status F = 0 when the used toner container 84 has a high filling level. It has the value F = 1 when the filling level is low. The microswitch 122 has the value M = 0 when the drawer 110 is pulled out; it has the value M = 1 when the drawer is completely pushed in. The signal of the microswitch 200 is employed for checking the respectively proper position of the locking plate 100, for example whether the locking plate has been lowered, after the drawer was pushed back in. A determination can be made with this information as to whether a toner transport from the adapter unit 82 through the hose 92 is possible. When a certain amount of toner has arisen, then it must be assured that this can be eliminated from the adapter unit 82 into the used toner container.

The statuses Z1 through Z4 are defined according to the aforementioned signal statuses F and M. These various operating statuses Z1 through Z4 are graphically illustrated in Figures 20 and 21. In the condition Z1 (Figure 20, left), the drawer 110 is withdrawn and the used toner level 130 is high, i.e. the used toner container is to be replaced. In this operating condition, the used toner container 84 must be replaced within a predetermined changing time; otherwise, the control generates an abort signal and printing operations are suspended. Instead of the changing time, the amount of used toner that has actually arisen can also be interpreted, for example by determining the plurality of printed picture elements and of the contrast that is thereby set or by determining the amount of conveyed toner.

In the status Z2, the pivot element 118 swivelled against the filling level sensor 120 simulates a full used toner container. The drawer 110 is closed and the microswitch 122 is actuated. When no used toner container

is introduced within a predetermined time given this operating condition, then printer operations are suspended.

In the operating status Z3 according to Figure 21, the drawer 110 is opened and the filling level sensor 120 indicates that the used toner level 130 still lies below the full level. When the drawer is not closed within a predetermined time given this operating condition, then printer operations are suspended.

The operating status Z4 defines the printing mode without malfunction. The drawer 110 is closed and the capacitative filling level sensor 120 indicates that the used toner level 130 is low and the used toner container 84 can still accept an adequate quantity of used toner.

By evaluating the signal statuses F and M of the sensors 120 and 122, the control of the printer can reliably control printing operations and monitor the replacement of the used toner container free of printing operations in all operating conditions.

Figure 22 shows further possibilities for the replacement of the used toner container without having to interrupt printing operations. What is critical for the replacement of the used toner container free of printing operations is that the filling level sensor 120 outputs a full signal at a status when there is still adequate space for toner and there is still adequate time remaining in order to undertake steps for the replacement of the used toner container 84. When the remaining time until the full condition of the used toner container 84 is exceeded, then the control must immediately arrest printer operations in order to prevent an overfilling of the used toner container 84 and a possible toner jam. The remaining time can be determined on the basis of printed pages or the time can be fixed dependent on the occurrence of used toner. The occurrence of used toner derives from the transfer printing efficiency and can be exactly determined by the control, for example, on the basis of the printed picture elements in conjunction with the transfer printing efficiency and the printing contrast. In this version, the time until the replacement of the used toner container has been completed is maximum.

In order to be able to undertake the replacement of the used toner container during ongoing printer operation, the used toner that arises must be collected in the interim. Figure 22 shows various measures as alternative or combined possibilities. The used toner conveyed by a conveyor 132 proceeds into the used toner container 84 via an adapter hose 136 in the normal operating condition. The conveyor 132 is driven by a drive 134. When a controllable coupling is inserted between this drive 134 and the conveyor 132, the conveyor 132 can be at a standstill during the replacement of the used toner container 84. The used toner arising during the replacement then remains in the conveying channel of the conveyor 132.

Another possibility is comprised in arranging a closure 138 at the level of the flexible adapter hose 136, this closure 138 being actuated for replacing the used toner container. Further, an intermediate container 142 can be provided that replaces the used toner container 84 while the used toner container 84 is being replaced and collects the used toner. The operation of the controllable coupling, of the intermediate container 142 or of the closure 138 can be controlled via the microswitch 122 that determines the withdrawal of the drawer 110. Dependent on the signal of the microswitch 122, the corresponding actuators can then be activated.

CLAIMS

1. Device for the electrophotographic production of image patterns on a recording medium, particularly a printer or copier, comprising at least one printing unit to which toner is supplied, whereby the elimination of the used toner collected from a cleaning station (80) to a used toner container (84) is interruptible in order to enable a replacement of the used toner container (84) free of printing interruptions, and whereby a controllable coupling that can be actuated for changing the used toner container free of printing interruptions is connected between a drive (134) and a conveyor shaft (132) for toner elimination from the cleaning station (20).

2. Device according to claim 1, characterized in that the used toner is transported between cleaning station (80) and used toner container (84) via an adapter unit (82) with a conveyor (132) through a conveying channel (92); and in that used toner arising during the replacement of the used toner container (84) is intermediately stored in the conveying channel.

3. Device according to claim 1 or 2, characterized in that the adapter unit comprises a flexible hose (92).

4. Device according to claim 3, characterized in that the emergence of the used toner from the adapter unit (82) is preventable with the flexible hose (92).

5. Device according to claim 4, characterized in that a closing mechanism (138) that is actuated for replacing the used toner container (84) is arranged at the flexible hose (82).

6. Device according to one of the claims 3 through 5, characterized in that the flexible hose (92) has a material at its inside that is impenetrable for a toner and is toner-repellant; and in that it is preferably manufactured of silicone.

7. Device according to one of the claims 3 through 6, characterized in that the flexible hose (92) expands conical frustum-shaped in the direction toward the used toner container (84).

8. Device according to one of the claims 2 through 7, characterized in that the adapter unit (82) has a stable collar (88) at the side of the cleaning unit (20) for acceptance in the cleaning unit (20) and has a stable receptacle (90) at the side of the used toner container (84) that is connected to a pivotable locking plate (100), whereby the flexible (92) hose is held in the collar and in the receptacle (90).

9. Device according to one of the preceding claims, characterized in that the used toner container (84) is accepted in a drawer (110) seated in running rails, preferably telescoping rails (112).

10. Device according to claim 9, characterized in that, when the drawer (110) is pulled out, the locking plate (100) has an end facing away from its pivot point (119) rising up on a ramp while compressing the flexible hose (92); and in that the locking plate (100) engages behind a stop edge (124) when the drawer (110) is pushed in.

11. Device according to one of the claims 9 or 10, characterized in that the drawer (110) contains a pivot element (118) pre-stressed with a spring (116) that, when the used toner container (84) is in its introduced condition, presses this against a filling level sensor (120); and in that the pivot element (118) is pivoted against the filling level sensor (120) in the status without introduced used toner container (84) and simulates a fully filled used toner container.

12. Device according to claim 11, characterized in that the filling level sensor (120) is fashioned as proximity sensor that outputs a full signal

given a filling height of the used toner corresponding to the position of the proximity switch.

13. Device according to one of the claims 9 through 12, characterized in that a microswitch (122) monitors the position of the drawer.

14. Device according to claim 12 and 13, characterized in that the control evaluates the signal statuses of the filling level sensor (120) and of the microswitch (122) in order to control the replacement of the used toner container and the printing operations.

15. Device according to one of the preceding claims 2 through 14, characterized in that an intermediate container (142) that can be pivoted in against the adapter unit (82) instead of the used toner container (84) is provided, the used toner being collected therein during the replacement of the used toner container (84).

16. Device according to one of the preceding claims, characterized in that at least one printing unit is provided to which toner is supplied from a toner reservoir (22) that is essentially permanently installed within the device and can be refilled at chronological intervals via filling opening (20), having a lockable device door (12a, 12b) for covering internal parts of the device as well as of the toner reservoir (22), having an electrical safety means that interrupts the operation of the device when the device door (12a, 12b) is open, whereby a closeable opening through which the toner reservoir (22) can be refilled from the outside without interrupting printing operations is provided in the device door (12a, 12b) in the region of the filling opening (20) of the toner reservoir (22).

17. Device according to claim 16, characterized in that the opening can be closed by a pivotable flap (14, 16) secured in the door (12a, 12b).

18. Device according to claim 17, characterized in that the flap (14, 16) is fashioned such that it forms a collecting container (32) for toner in the opened condition.

19. Device according to one of the claims 16 through 18, characterized in that the toner reservoir (22) comprises a mouthpiece that forms the filling opening, whereby the mouthpiece (34) is preferably releasably introducable.

20. Device according to one of the preceding claims 16 through 19, characterized in that a slight under-pressure is generated in the toner reservoir (22), at least during the filling procedure.

21. Device according to claim 20, characterized in that the toner reservoir (22) has an air elimination opening (66) to which a ventilator (64) or a connecting hose (72) to an air extraction channel within the device can be connected; and in that the air elimination opening (66) has a filter (70) that retains toner at the inside of the toner reservoir (22).

22. Device according to one of the preceding claims 16 through 21, characterized in that the toner filling level in the toner reservoir (22) is acquired by a filling level sensor (58); in that, given downward transgression of a predetermined filling level (75), an alarm signal is generated; and in that an abort signal with which printer operation is aborted is generated later dependent on further parameters.

23. Device according to claim 22, characterized in that a capacitative sensor is provided as filling level sensor (58), this being arranged displaceable in axial direction at the outside wall of the toner reservoir (22) and generating the alarm signal where the filling level in the toner reservoir (22) reaches or falls below its position; in that the remaining

toner in the toner reservoir (22) is identified after the occurrence of the alarm signal; and in that the abort signal is generated dependent on the use of this remaining toner.

24. Device according to claim 23, characterized in that the toner use is identified on the basis of the printed picture elements and of the printing contrast that has been set and/or on the basis of the number of printed individual pages.

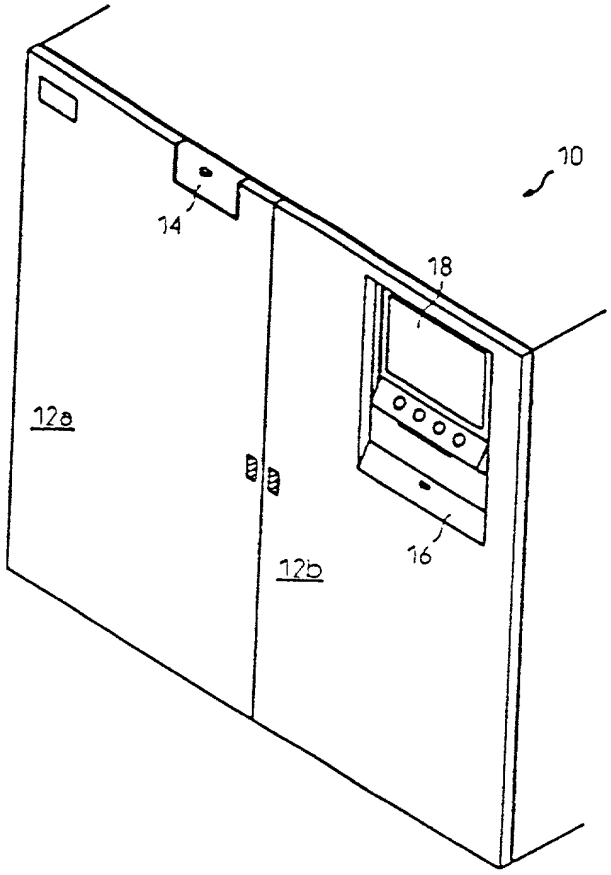


Fig. 1

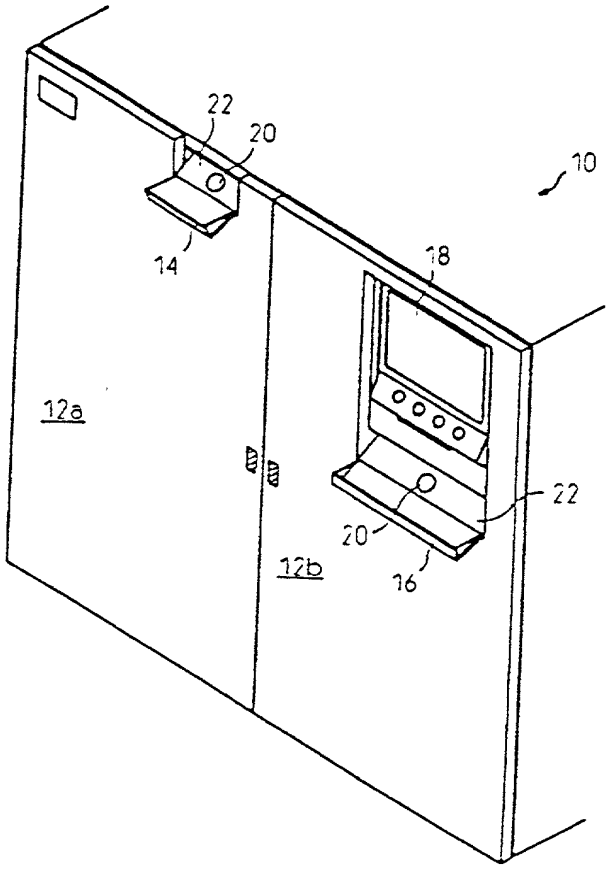


Fig. 2

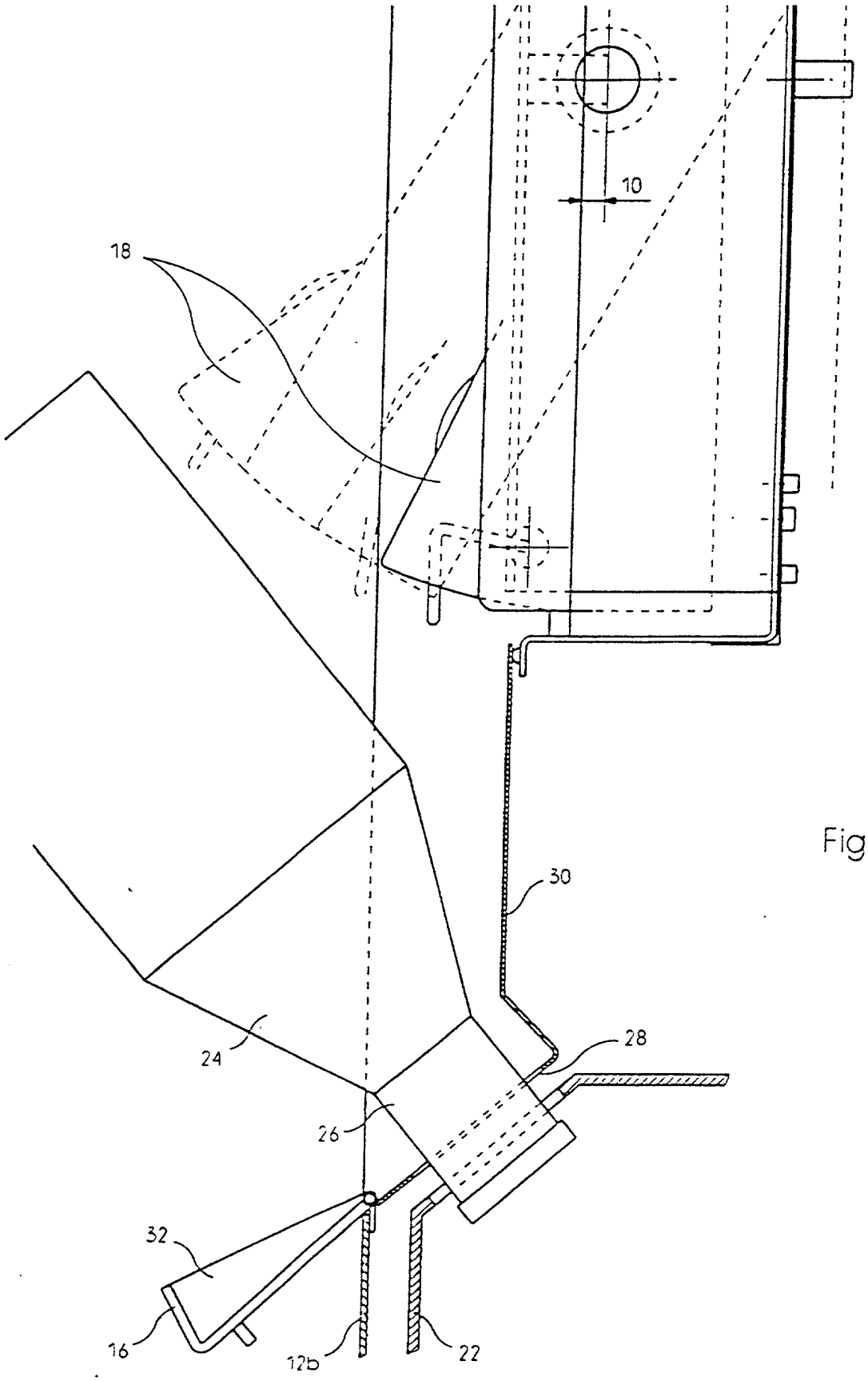


Fig. 3

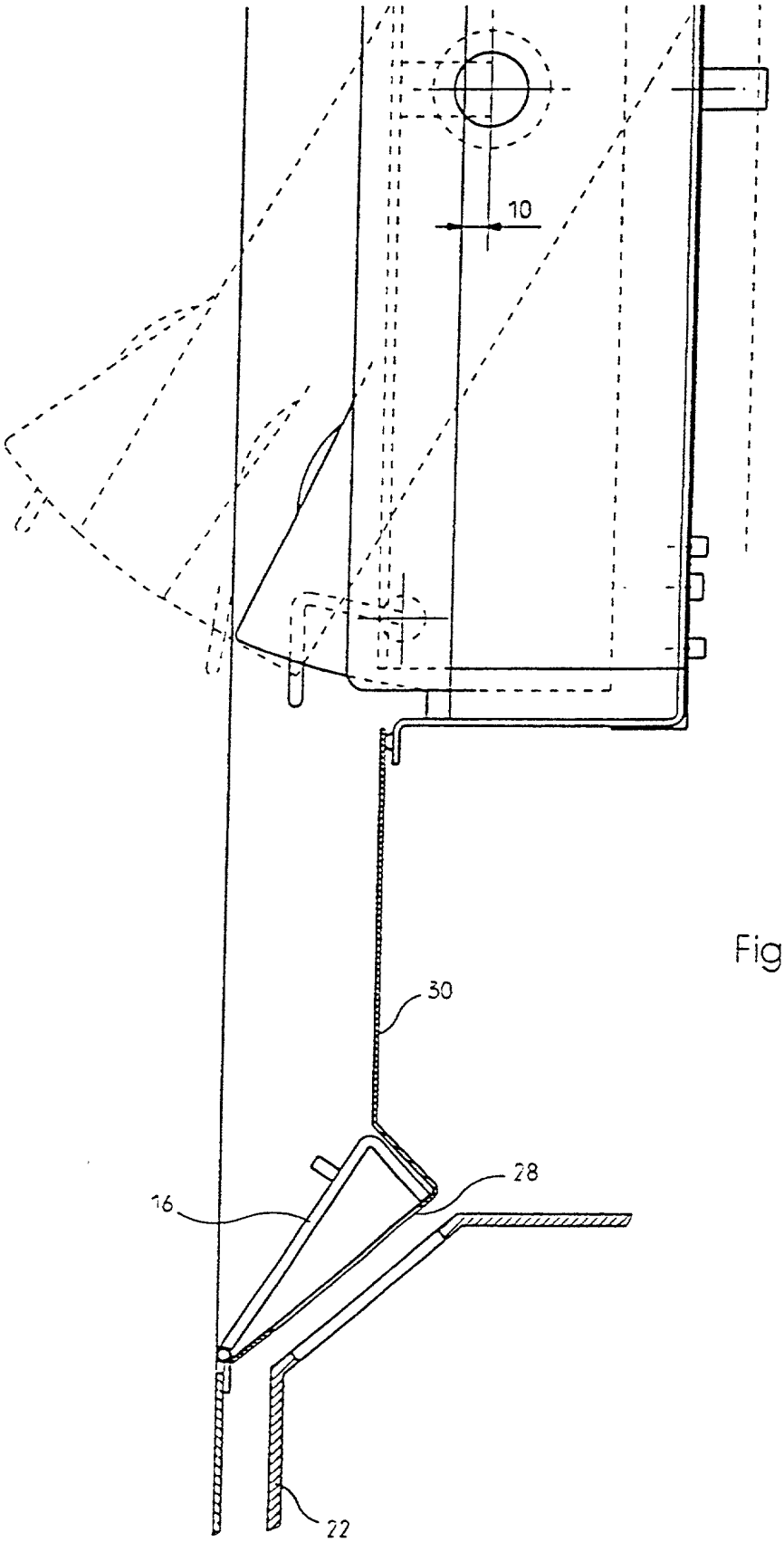


Fig. 4

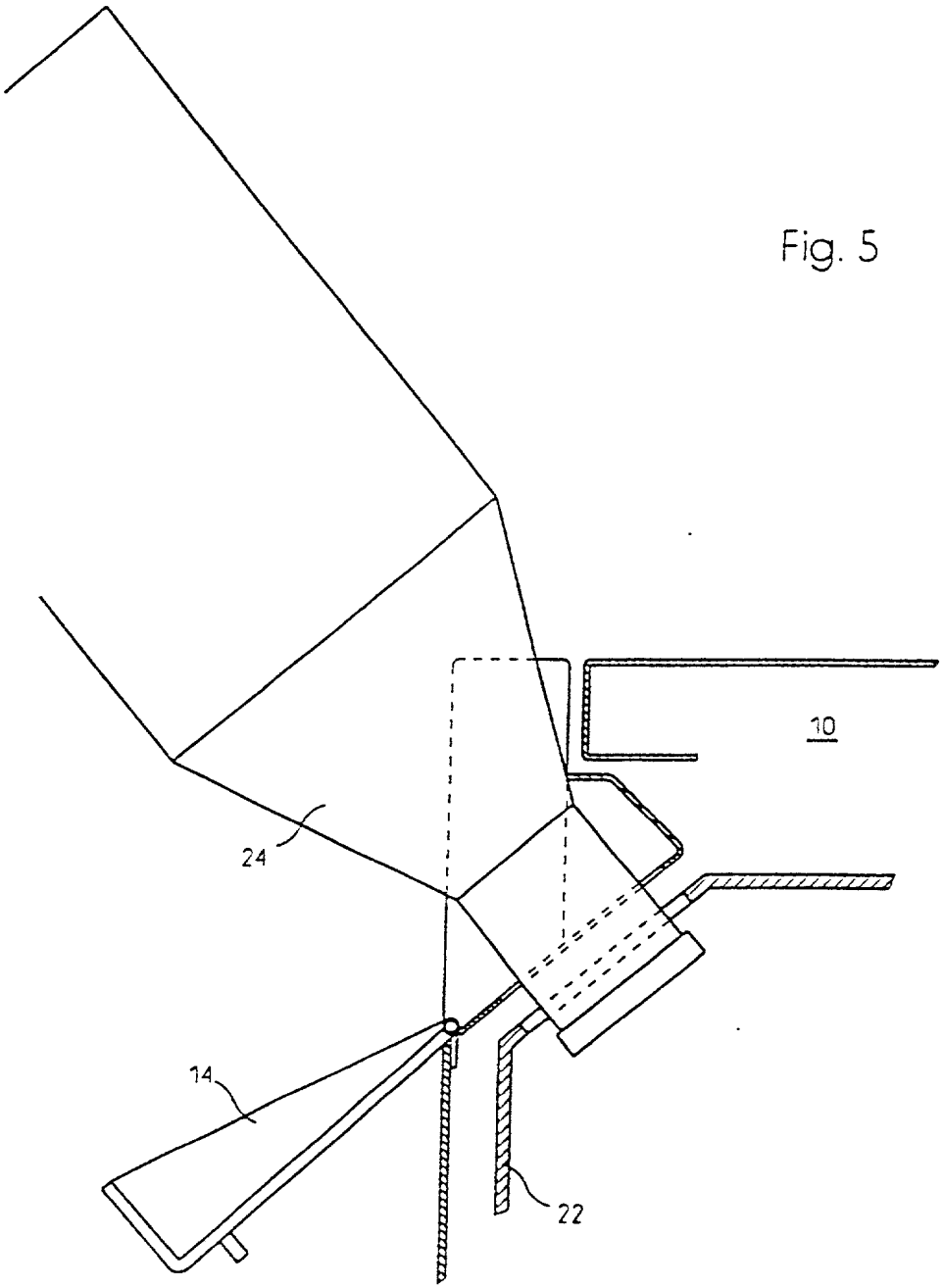
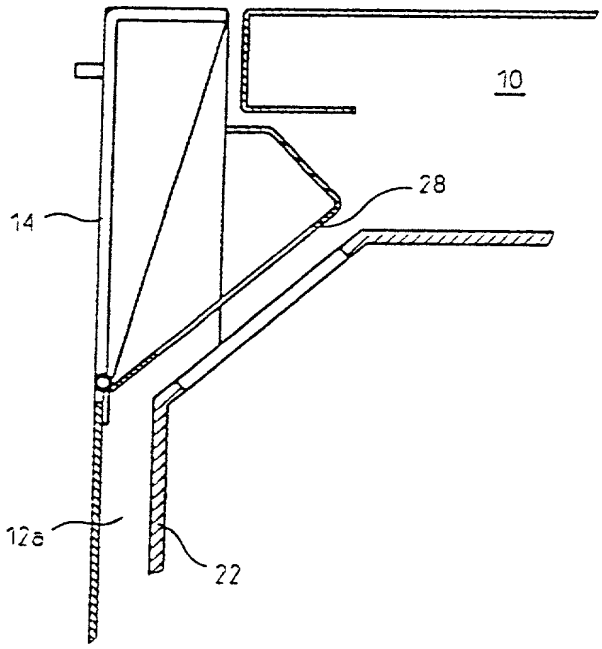
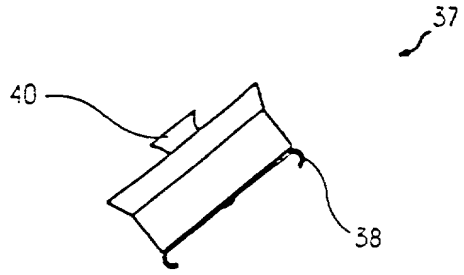
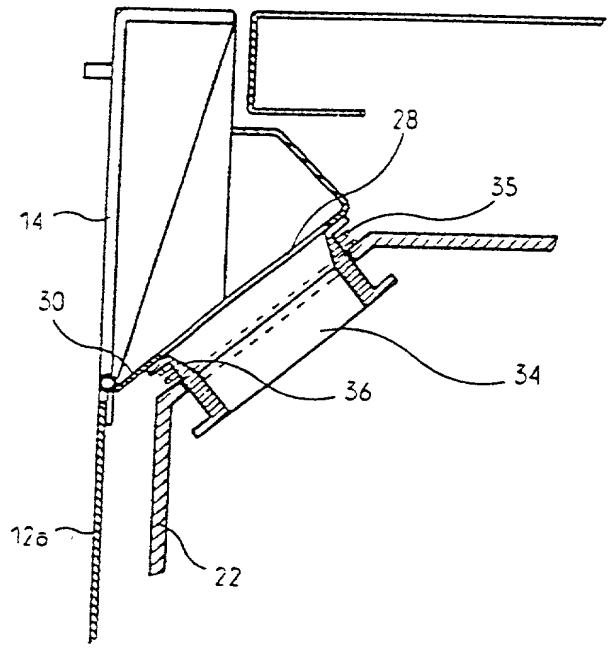


Fig. 5

Fig. 6







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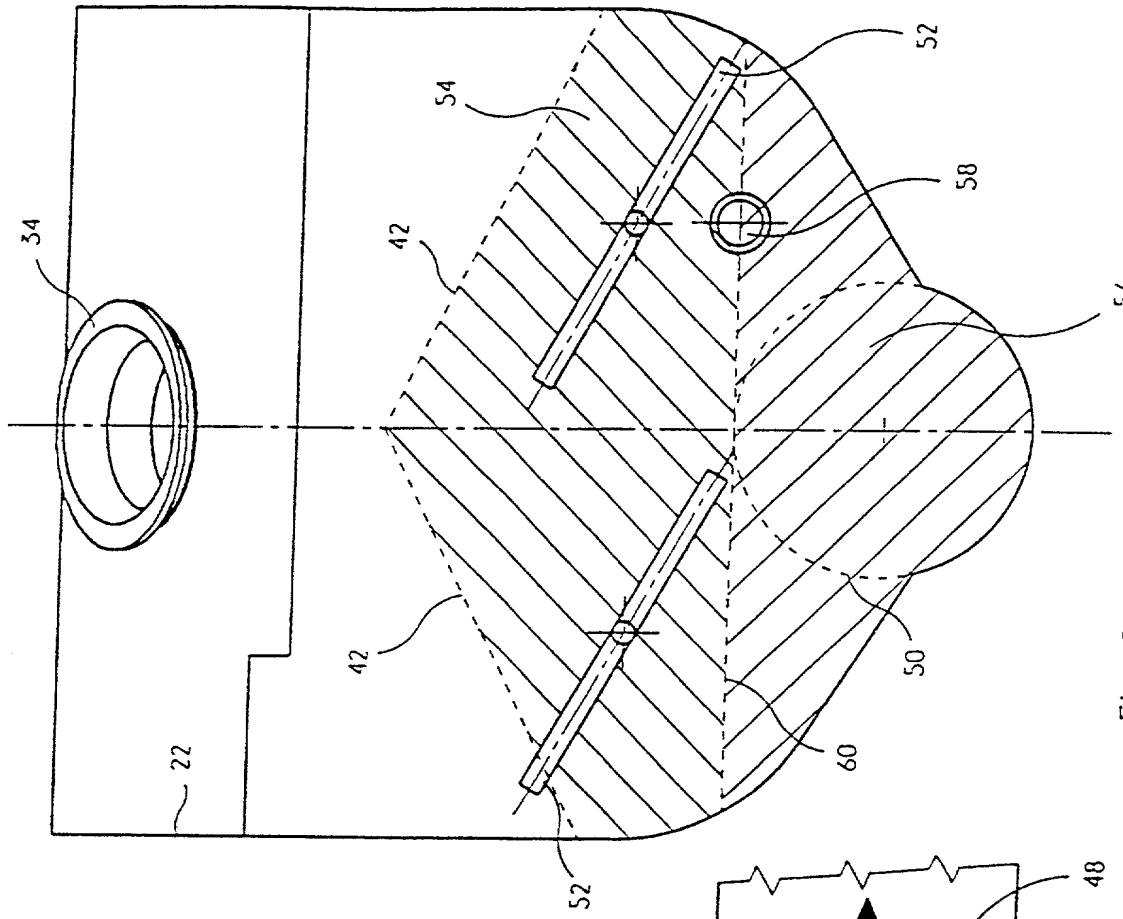

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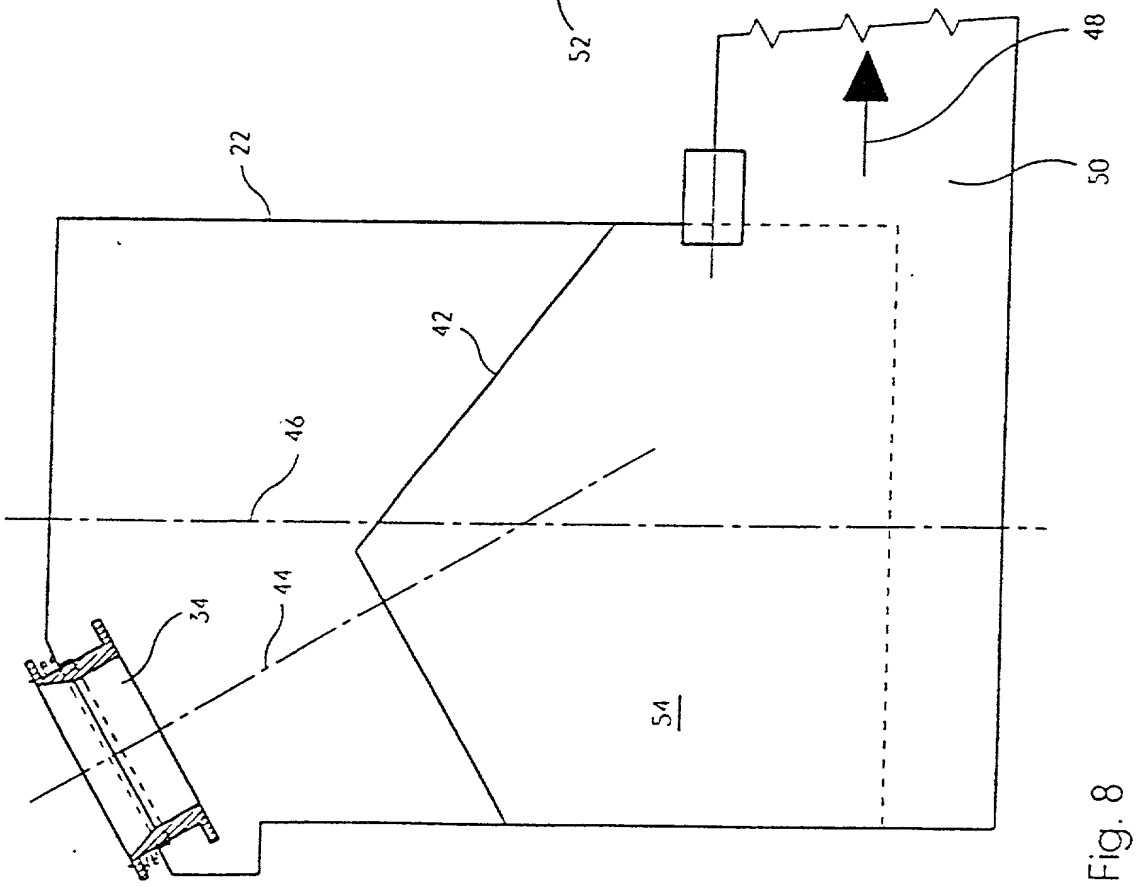

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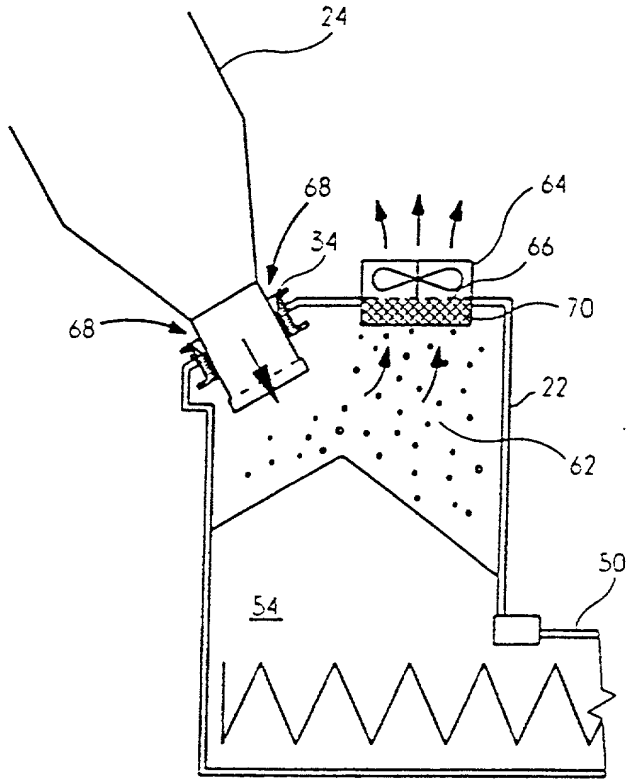

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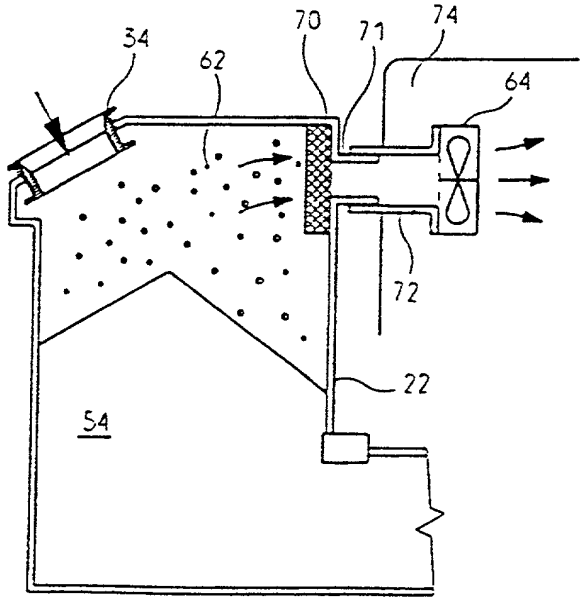

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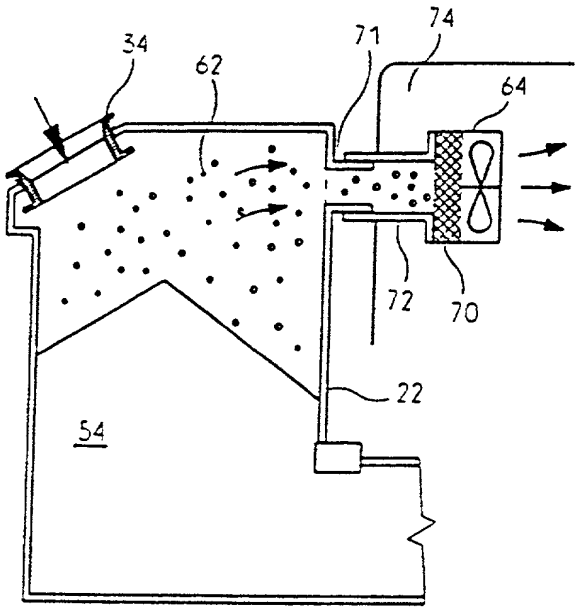

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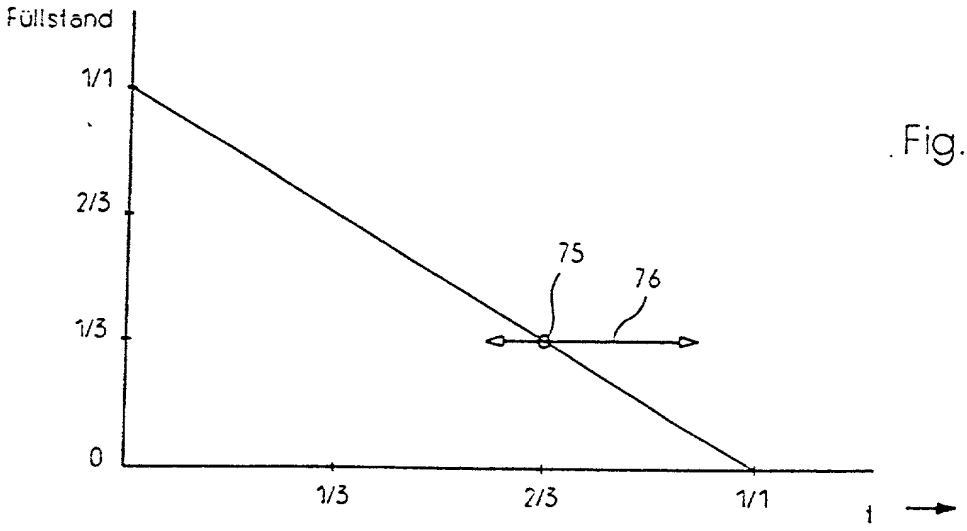

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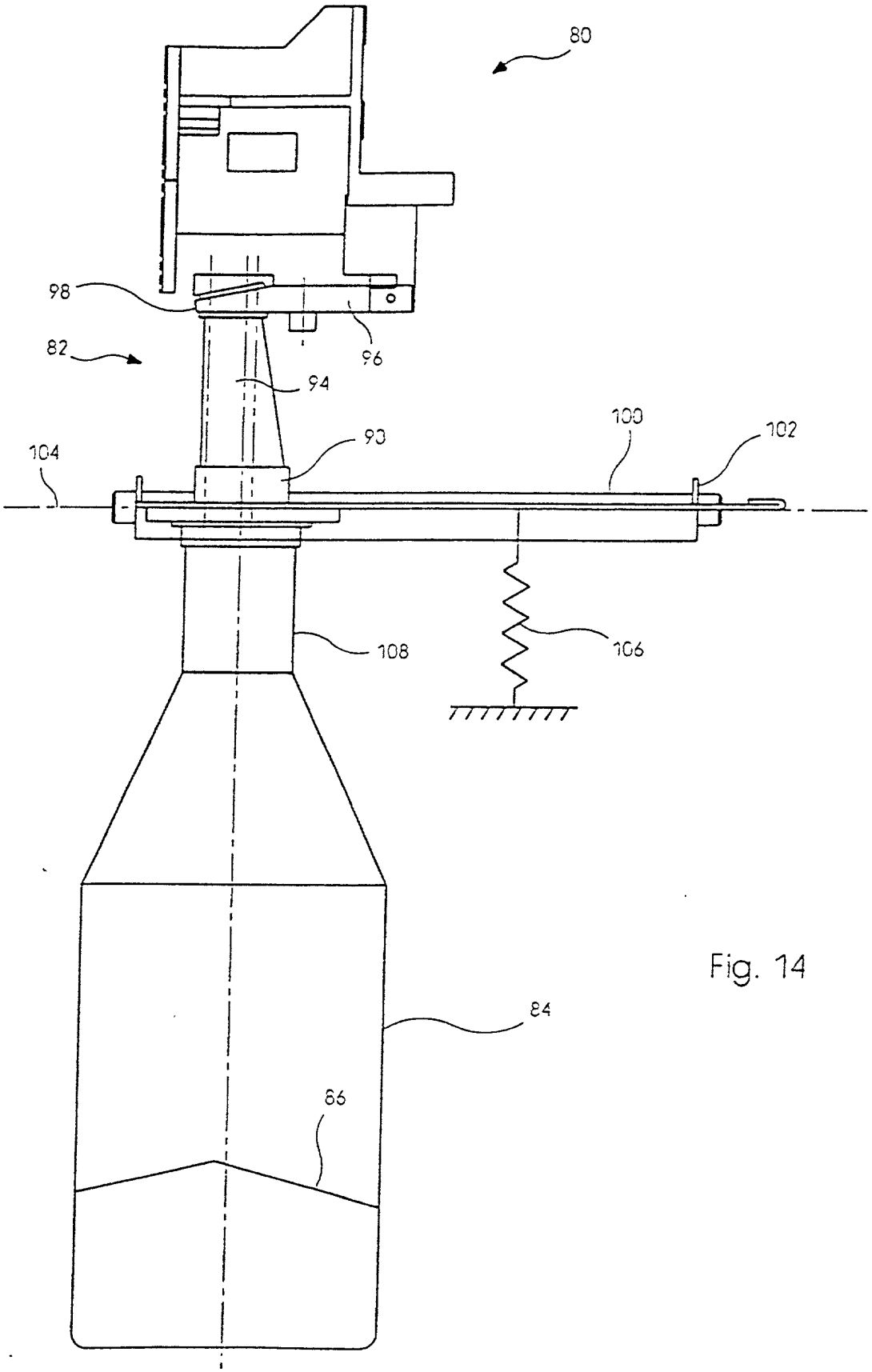


Fig. 14

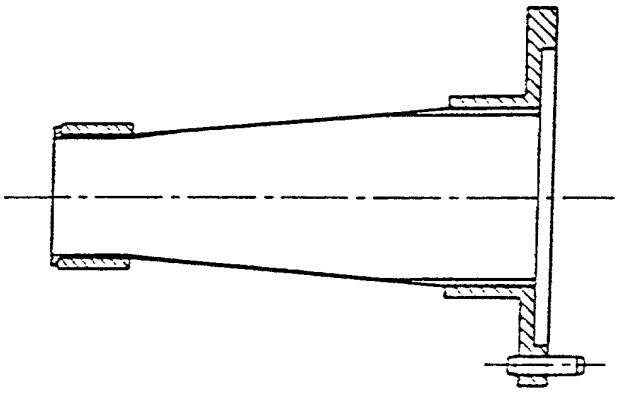
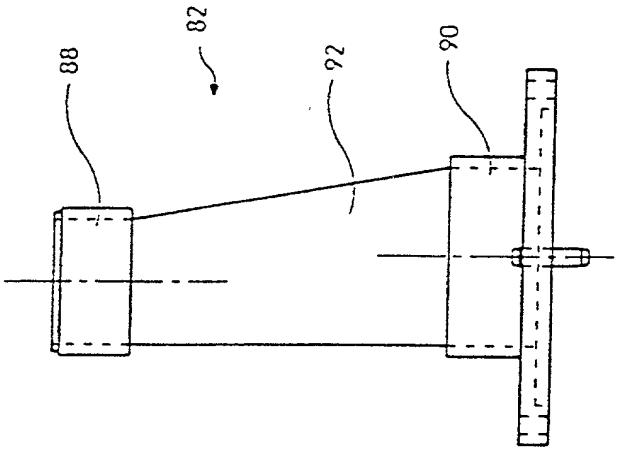
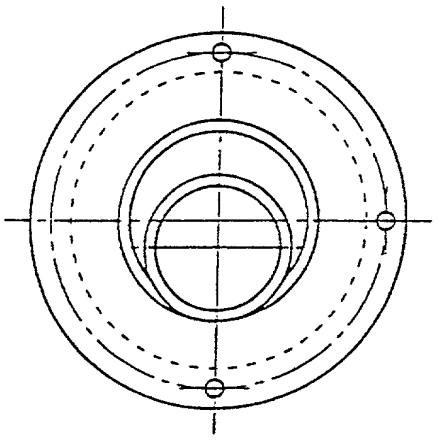
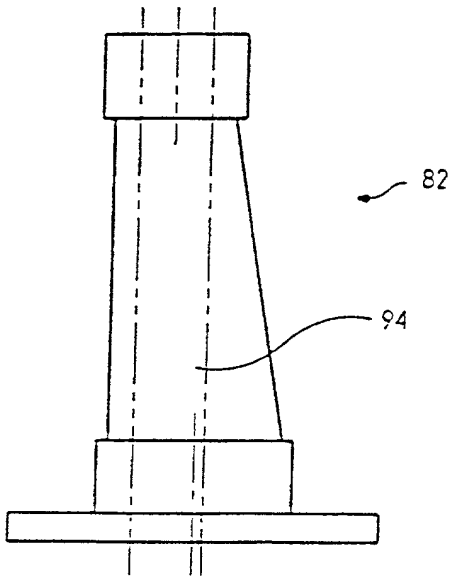


Fig. 15







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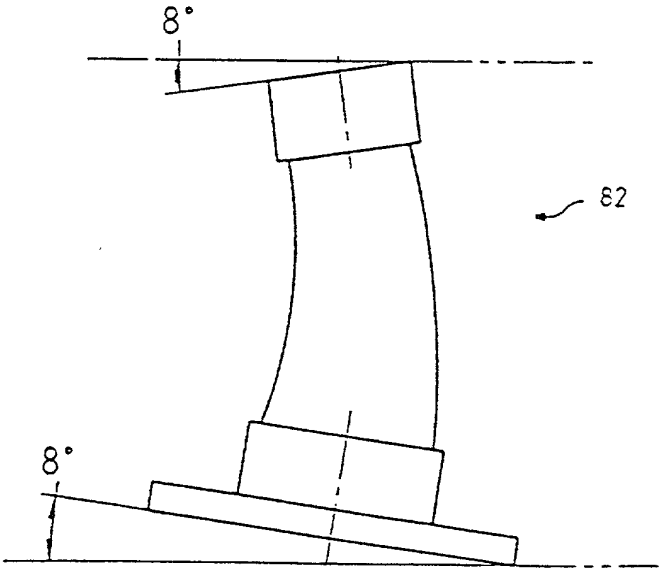


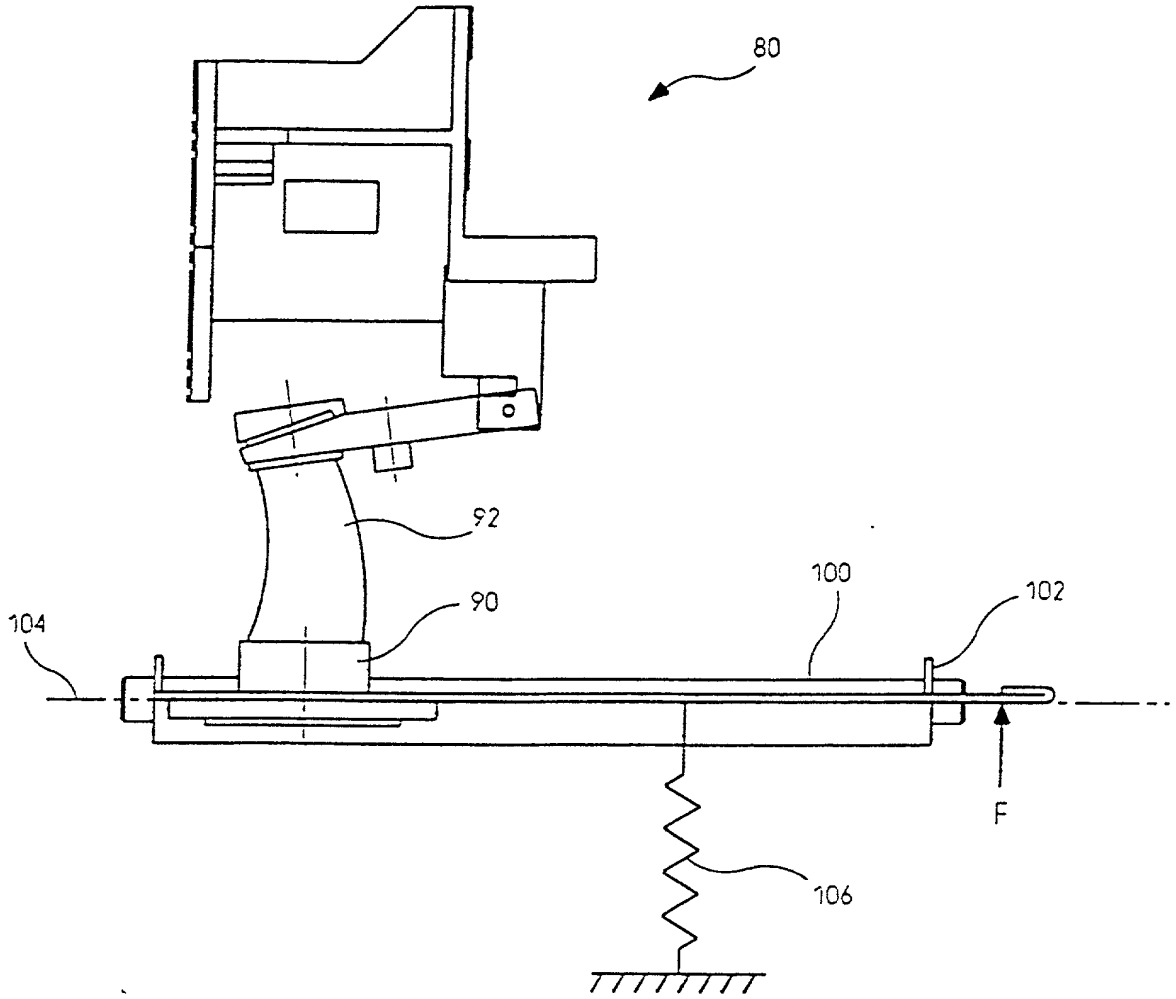
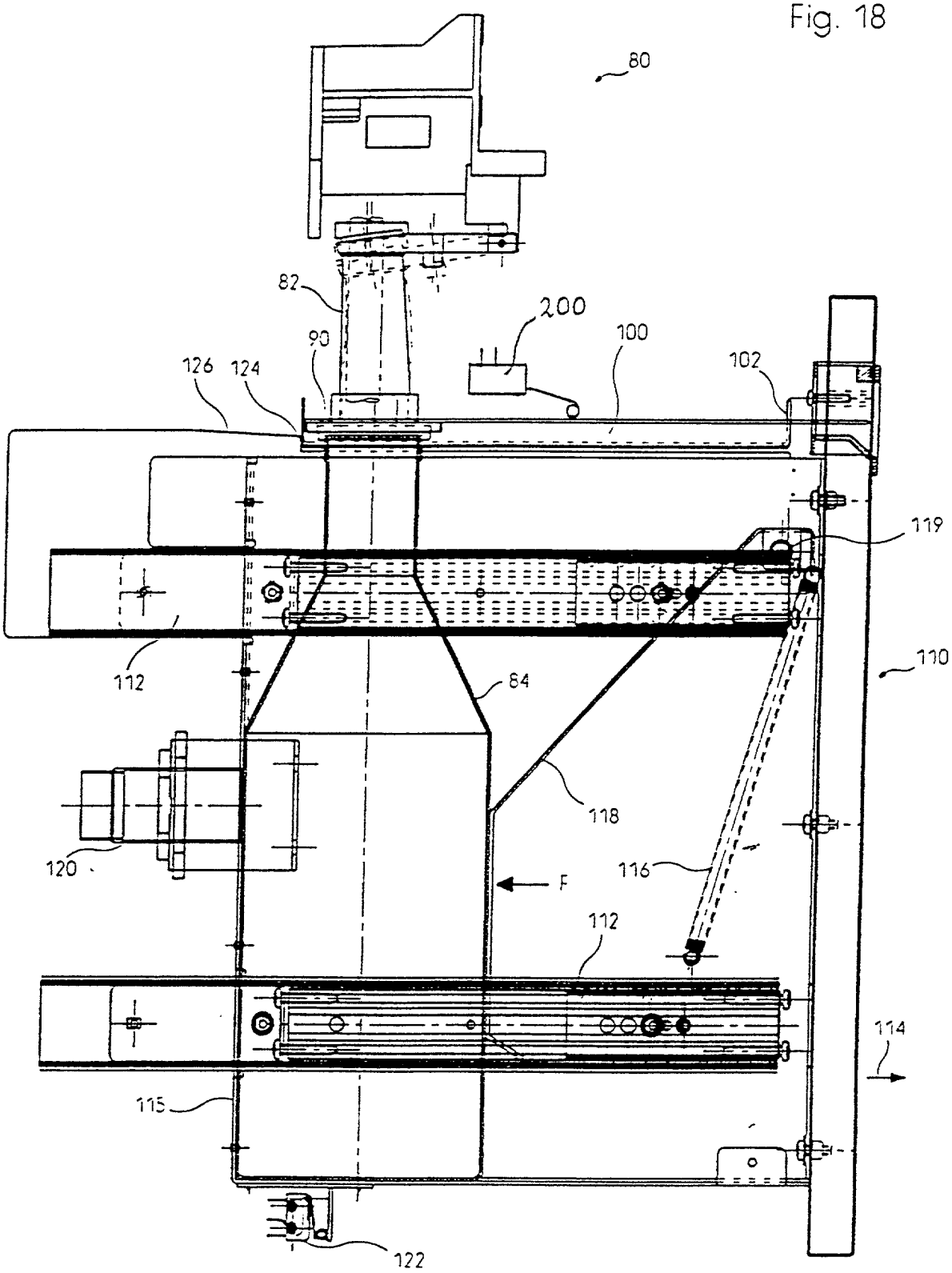


Fig. 17

Fig. 18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1	1	Z4

Fig. 19

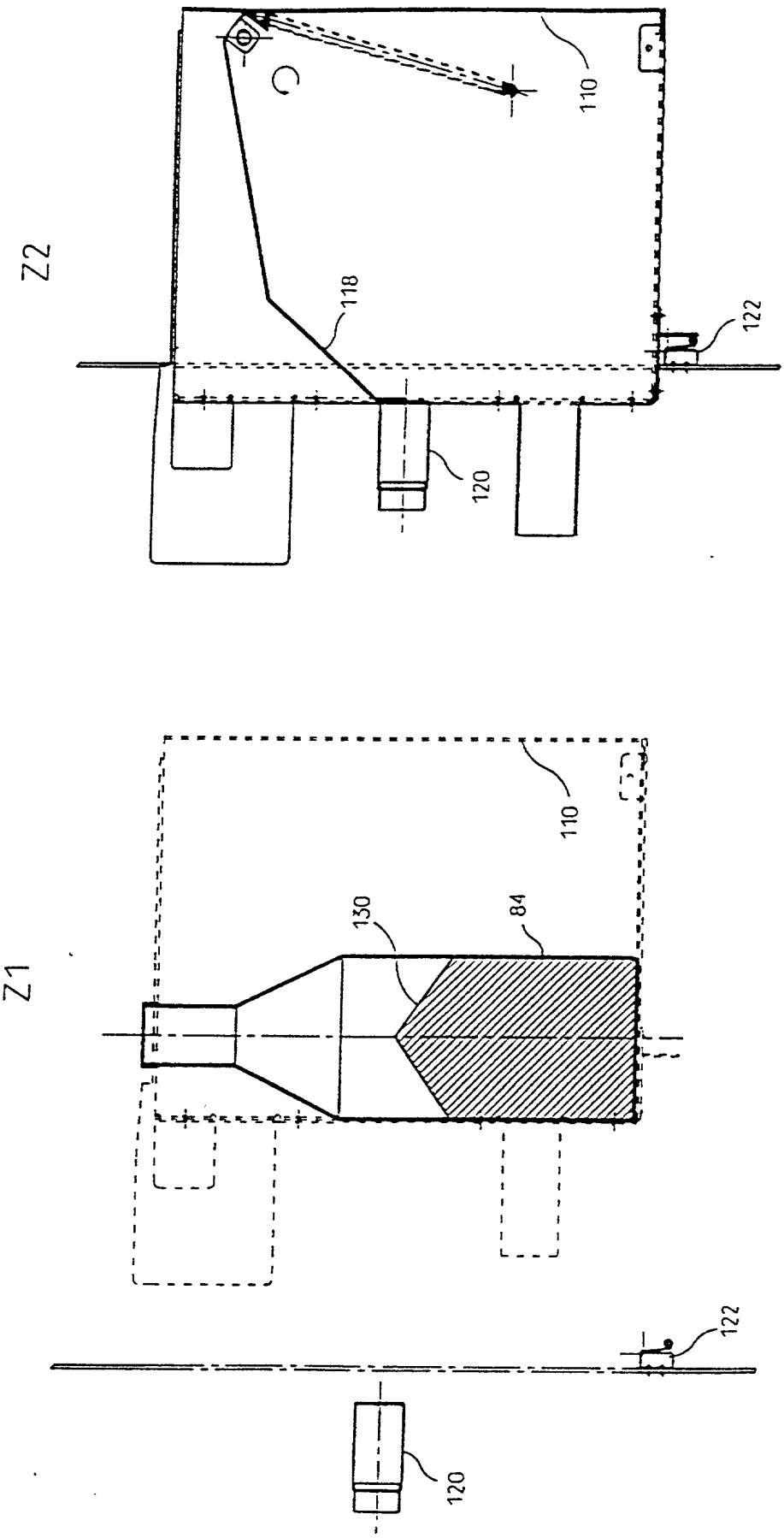
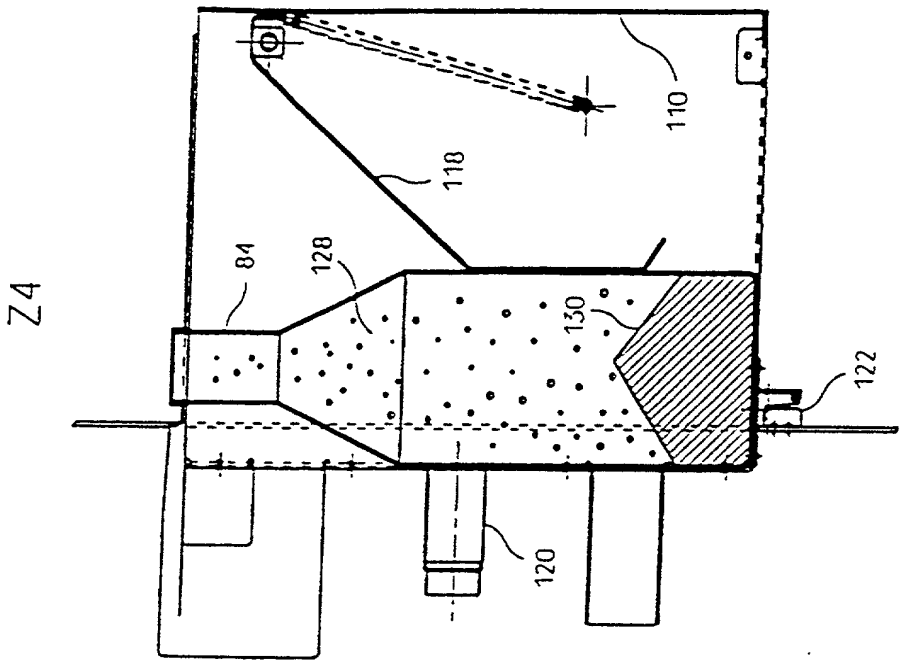


Fig. 20



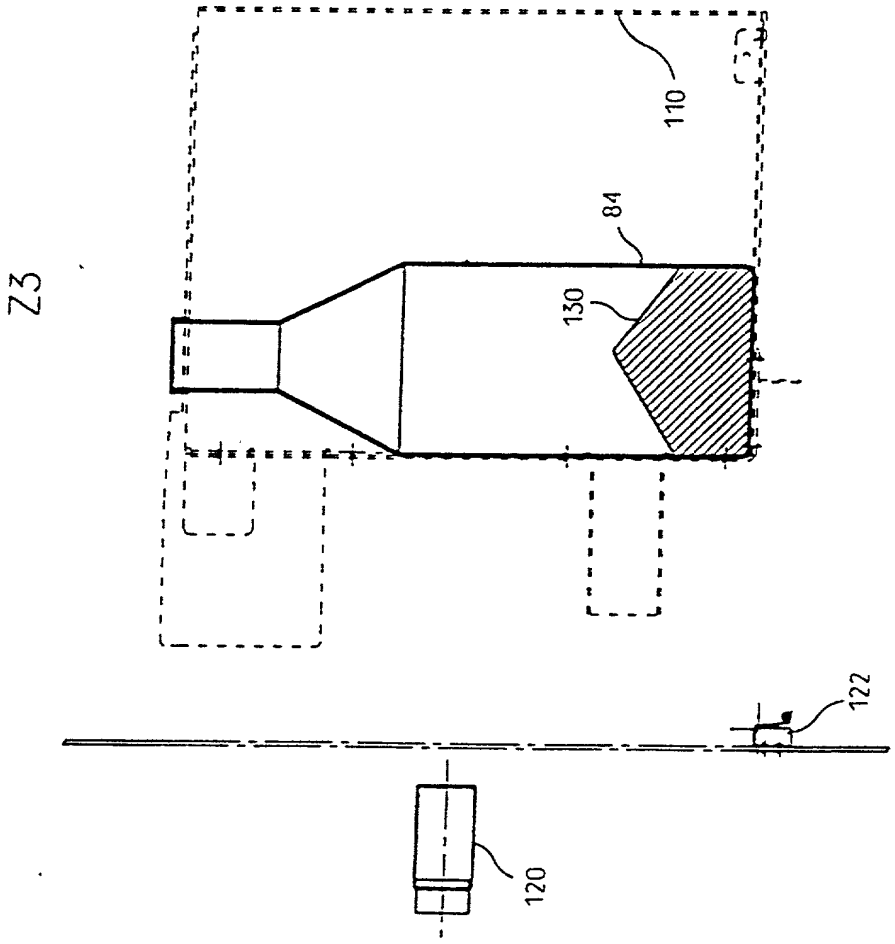


Fig. 21

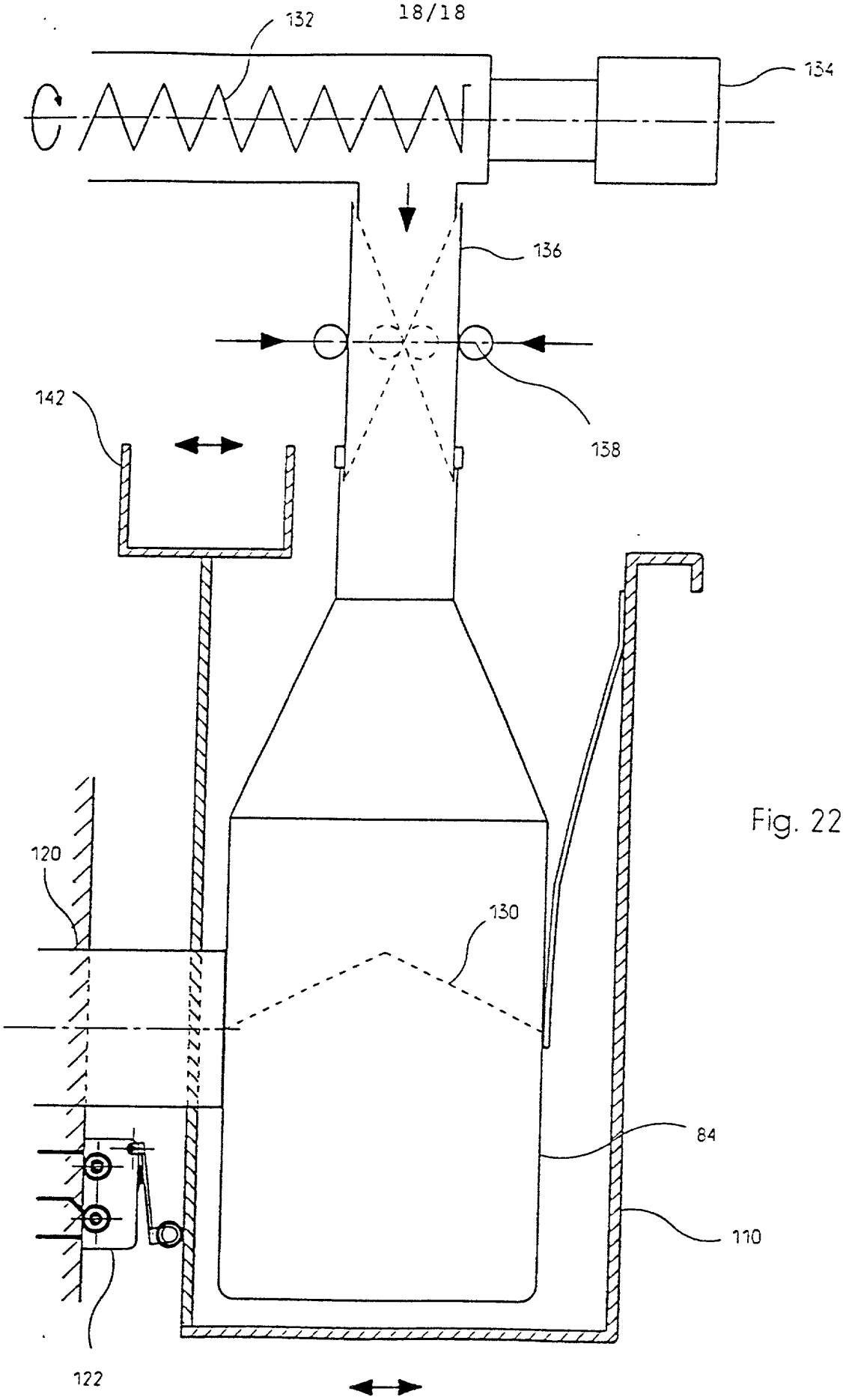


Fig. 22

#4

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION
ERKLÄRUNG FÜR PATENTANMELDUNGEN MIT VOLLMACHT
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

My residence, post office address and citizenship are as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für des dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

ELECTROPHOTOGRAPHIC MACHINE WITH A DEVICE TO REMOVE OLD TONER

the specification of which

(zutreffendes ankreuzen)

(check one)

☐ hier beigefügt ist.

☐ is attached hereto

☒ am October 15, 1997 als
PCT internationale Anmeldung
PCT Anmeldungsnummer PCT/DE97/02385
eingereicht wurde und am _____
abgeändert wurde (falls tatsächlich abgeändert).

☒ was filed on October 15, 1997
as United States application Number or PCT international application Number PCT/DE97/02385
and was amended on _____
(if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

			Priority Claimed	
196 42 570.0	Germany	15 October 1996	☒	☐
(Number)	(Country)	(Day Month Year Filed)	Yes	No
(Nummer)	(Land)	(Tag Monat Jahr eingereicht)	Ja	Nein
_____	_____	_____	☐	☐
(Number)	(Country)	(Day Month Year Filed)	Yes	No
(Nummer)	(Land)	(Tag Monat Jahr eingereicht)	Ja	Nein
_____	_____	_____	☐	☐
(Number)	(Country)	(Day Month Year Filed)	Yes	No
(Nummer)	(Land)	(Tag Monat Jahr eingereicht)	Ja	Nein

Ich beanspruche hiermit germäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122 I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Eklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint Messrs. John D. Simpson (Registration No. 19,842), Dennis A. Gross (24,410), Robert M. Barrett, (30,142), Steven H. Noll (28,982), Kevin W. Guynn (29,927), Robert M. Ward (26,517), Brett A. Valiquet (27,841), Edward A. Lehman (22,312), David R. Metzger (32,919),Todd S. Parkhurst (26,494), James D. Hobart (24,149), Melvin A. Robinson (31,870), John R. Garrett (27,888), Paula J. Kelly (37,624), John W. Cornell (30,619), Robert J. Depke (37,607), Joseph P. Reagen (35,332), Michael R. Hull (35.902), Michael S. Leonard (37,557), William E. Vaughan (39,056) and Lewis T. Steadman (17,074), all members of the firm of Hill & Simpson, A Professional Corporation

Telefongespräche bitte richten an:
(Name und Telefonnummer)

Direct Telephone Calls to: (name and telephone number)

312/876-0200
Ext.

Postanschrift:

Send Correspondence to:

HILL & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders:	Full name of sole or first inventor: BLASIUS WILHELM
Unterschrift des Erfinders Datum	Inventor's signature Date Blasius Wilhelm 21/04/99
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Staatsangehörigkeit	Citizenship Germany
Postanschrift	Post Office Address Hauptstr. 33
	D86356 Neusaess, Germany

Voller Name des zweiten Miterfinders (falls zuttreffend): 2-00	Full name of second joint inventor, if any: GEORG BOEHMER
Unterschrift des Erfinders Datum	Inventor's signature Georg Böhmer Date 9.4.99
Wohnsitz	Residence D81247 Muenchen, Germany DEX
Staatsangehörigkeit	Citizenship Germany
Postanschrift	Post Office Address Lustheimstr. 8 D81247 Muenchen, Germany

Voller Name des dritten Miterfinders (falls zuttreffend): 3-00	Full name of third joint inventor, if any: KARL-HEINZ JENAK
Unterschrift des Erfinders Datum	Inventor's signature Karl-Heinz Jenak Date 9.4.99
Wohnsitz	Residence D81369 Muenchen, Germany DEX
Staatsangehörigkeit	Citizenship Germany
Postanschrift	Post Office Address Gottfried-Boehm-Ring 31 D81369 Muenchen, Germany

Voller Name des vierten Miterfinders (falls zuttreffend): 4-00	Full name of fourth joint inventor, if any: JOSEPH KNOTT
Unterschrift des Erfinders Datum	Inventor's signature Joseph Knott Date 12.4.99
Wohnsitz	Residence D82327 Tutzing, Germany DEX
Staatsangehörigkeit	Citizenship Germany
Postanschrift	Post Office Address Groeschlstr. 18
	D82327 Tutzing, Germany

(Bitte entsprechende Informationen und Unterschriften im Falle von zweiten und weiteren Miterfindern angeben).

(Supply similar information and signature for second and subsequent joint inventors).

Voller Name des funften Miterfinders (falls zuttreffend): 5-00	Full name of fifth joint inventor, if any: PETER BREMMER
Unterschrift des Erfinders Datum	Inventor's signature Date 5.4.99
Wohnsitz	Residence D85244 Roehrmoos, Germany DEX
Staatsangehörigkeit	Citizenship Germany
Postanschrift	Post Office Address Lagerhausstr. 2a D85244 Roehrmoos, Germany
Voller Name des sechsten Miterfinders (falls zuttreffend):	Full name of sixth joint inventor, if any:
Unterschrift des Erfinders Datum	Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address
Voller Name des siebenten Miterfinders (falls zuttreffend):	Full name of seventh joint inventor, if any:
Unterschrift des Erfinders Datum	Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von funften und weiteren Miterfindern angeben).

(Supply similar information and signature for fifth and subsequent joint inventors).